ARLINGTON PUBLIC SCHOOLS

In accordance with the provisions of the Massachusetts General laws, Chapter 30A, Section 20, notice is hereby given for the following meeting of the:

Arlington School Committee
School Committee Regular Meeting
Thursday, April 28, 2016
7:00 PM

Arlington School Committee / School Enrollment Task Force Committee Joint Meeting

Robbins Town Hall Auditorium
730 Massachusetts Avenue
Arlington, MA 02476

7:00 PM Report presented by HMFH Architects, Inc. Lori Cowles

- *Gibbs, Study for Renovations, Arlington, MA*
- *Ottoson Middle School, Study for Addition, Arlington, MA*

Questions and Answers

9:00 PM Adjournment

The listings of matters are those reasonably anticipated by the Chair, which may be discussed at the meeting. Not all items listed may in fact be discussed and other items not listed may also be brought up for discussion to the extent permitted by law.

Stated times and time amounts, listed in parenthesis, are the estimated amount of time for that particular agenda item. Actual times may be shorter or longer depending on the time needed to fully explore the topic.

Submitted by Kathleen Bodie, Ed.D., Superintendnet of Schools and Adam Chapdelaine, Town Manager

Town of Arlington, Massachusetts

7:00 PM Report presented by HMFH Architects, Inc. Lori Cowles

Summary:

- Gibbs, Study for Renovations, Arlington, MA
- Ottoson Middle School, Study for Addition, Arlington, MA

ATTACHMENTS:

	Type	File Name	Description
🗋	Presentation	GibbsOttosonPresentation042816_(1).pdf	Gibbs Ottoson Presentation
🗋	Report	Gibbs_Study_Report_042516.pdf	Gibbs Study for Renovations 4 25 2016
🗋	Report	Ottoson_Study_Report_042516_(1).pdf	Ottoson Middle School, Study for Addition 0425216

HMFH ARCHITECTS

OTTOSON MIDDLE SCHOOL STUDY FOR ADDITIONS

ARLINGTON, MASSACHUSETTS

Lori Cowles, AIA Principal

April 28, 2016


ACTON ST
APPLETON ST
ADDITION
OTTOSON
MIDDLE
SCHOOL

OTTOSON SCHOOL
PARKING LEVEL

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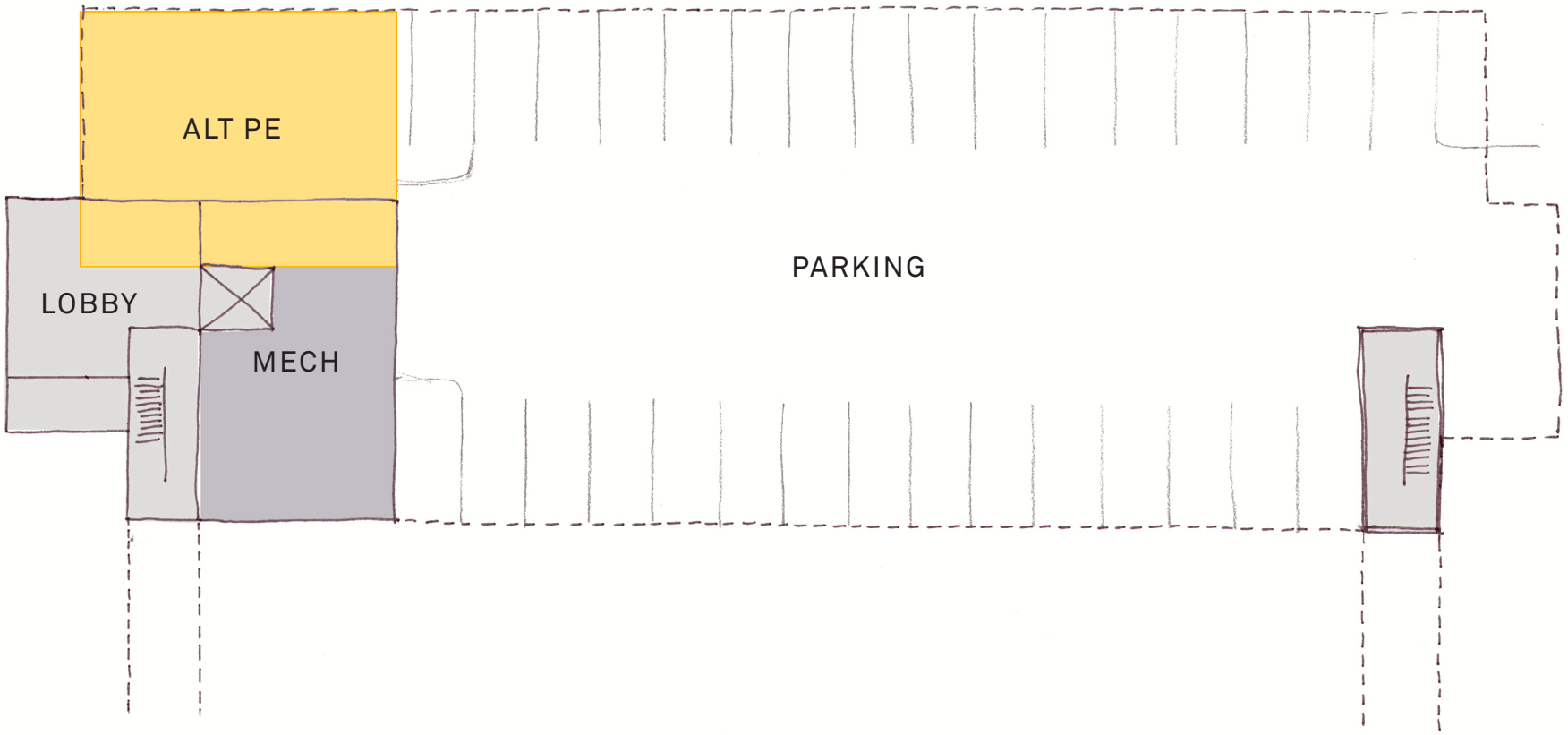

OTTOSON SCHOOL
FIRST FLOOR

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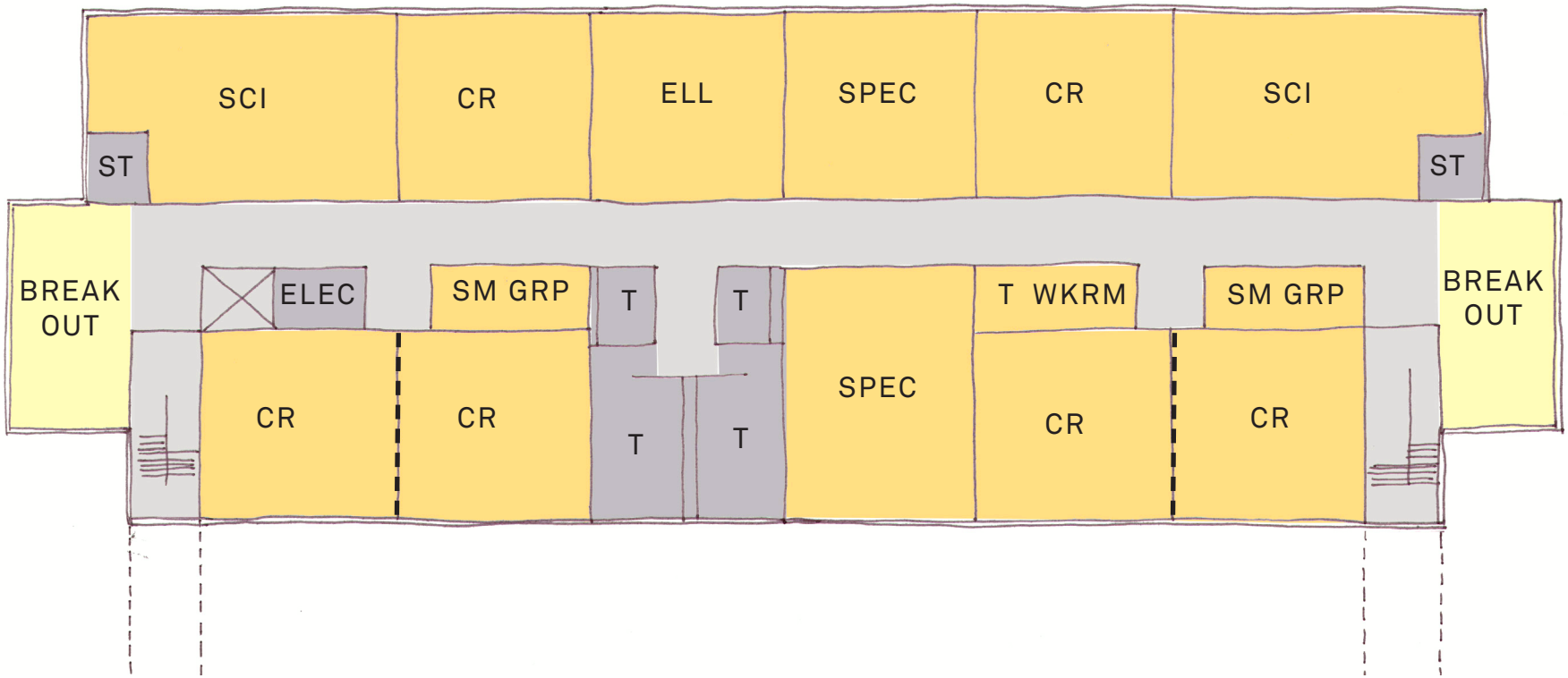
HMFH



OTTOSON SCHOOL
SECOND FLOOR

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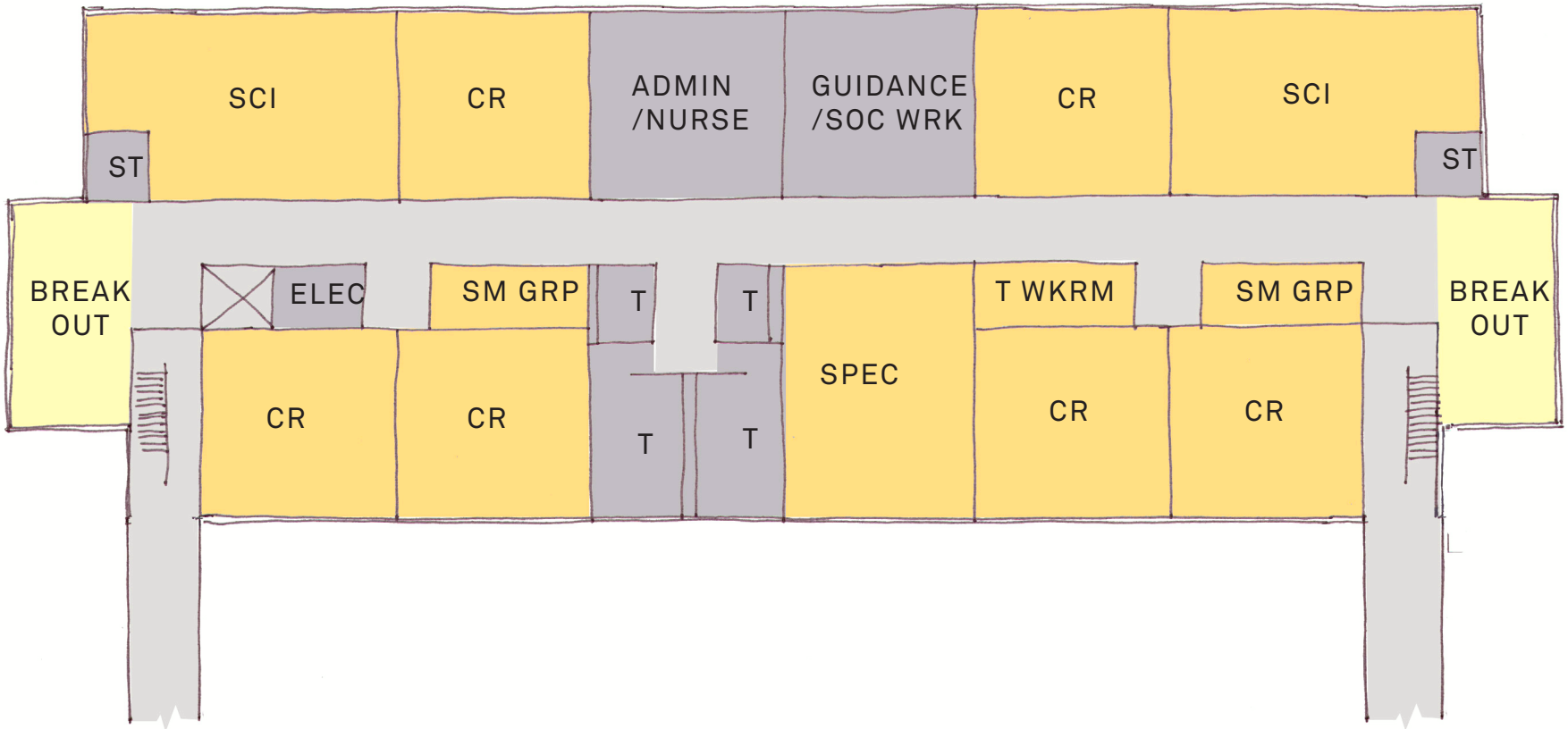
HMFH



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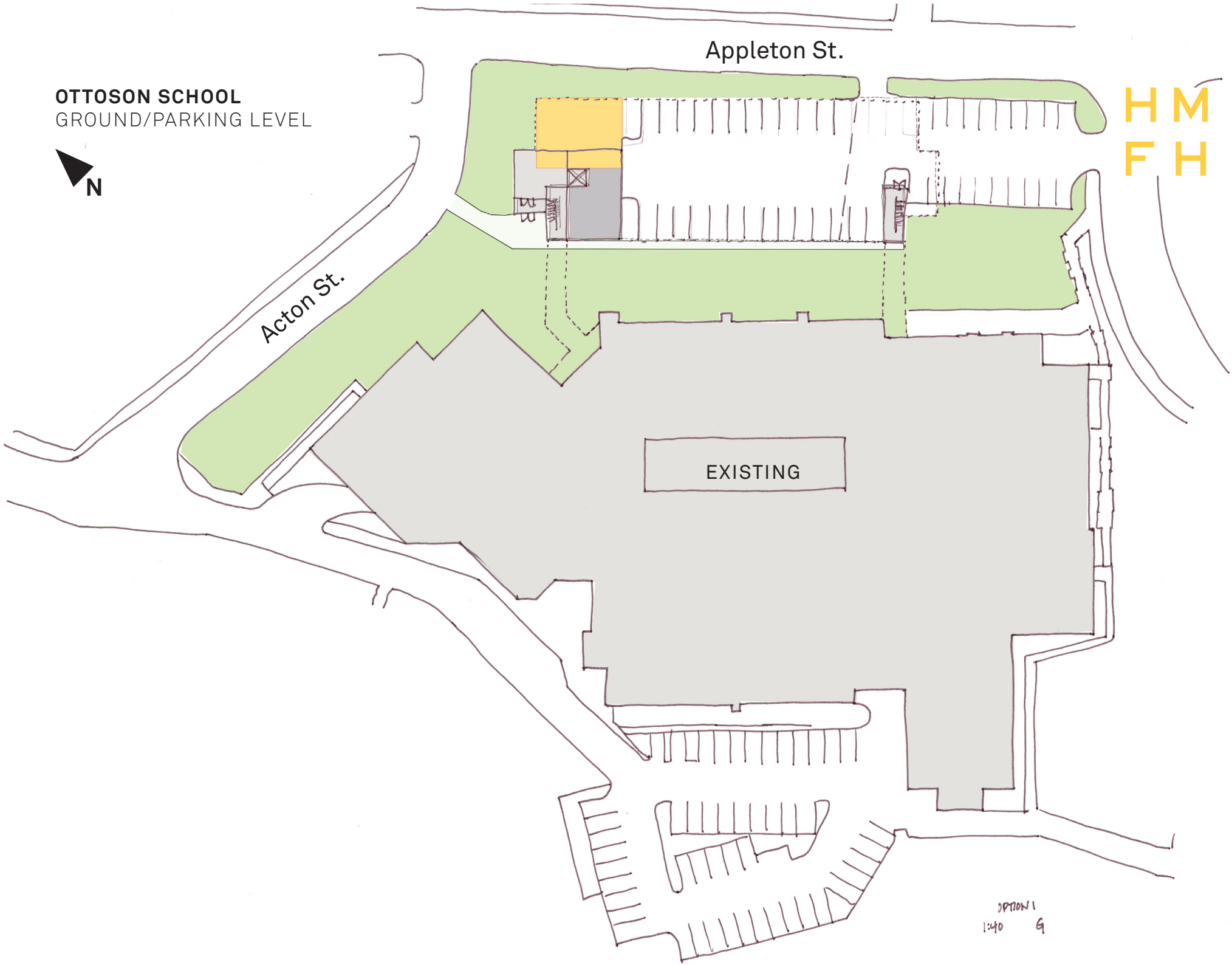
GROUND/PARKING LEVEL



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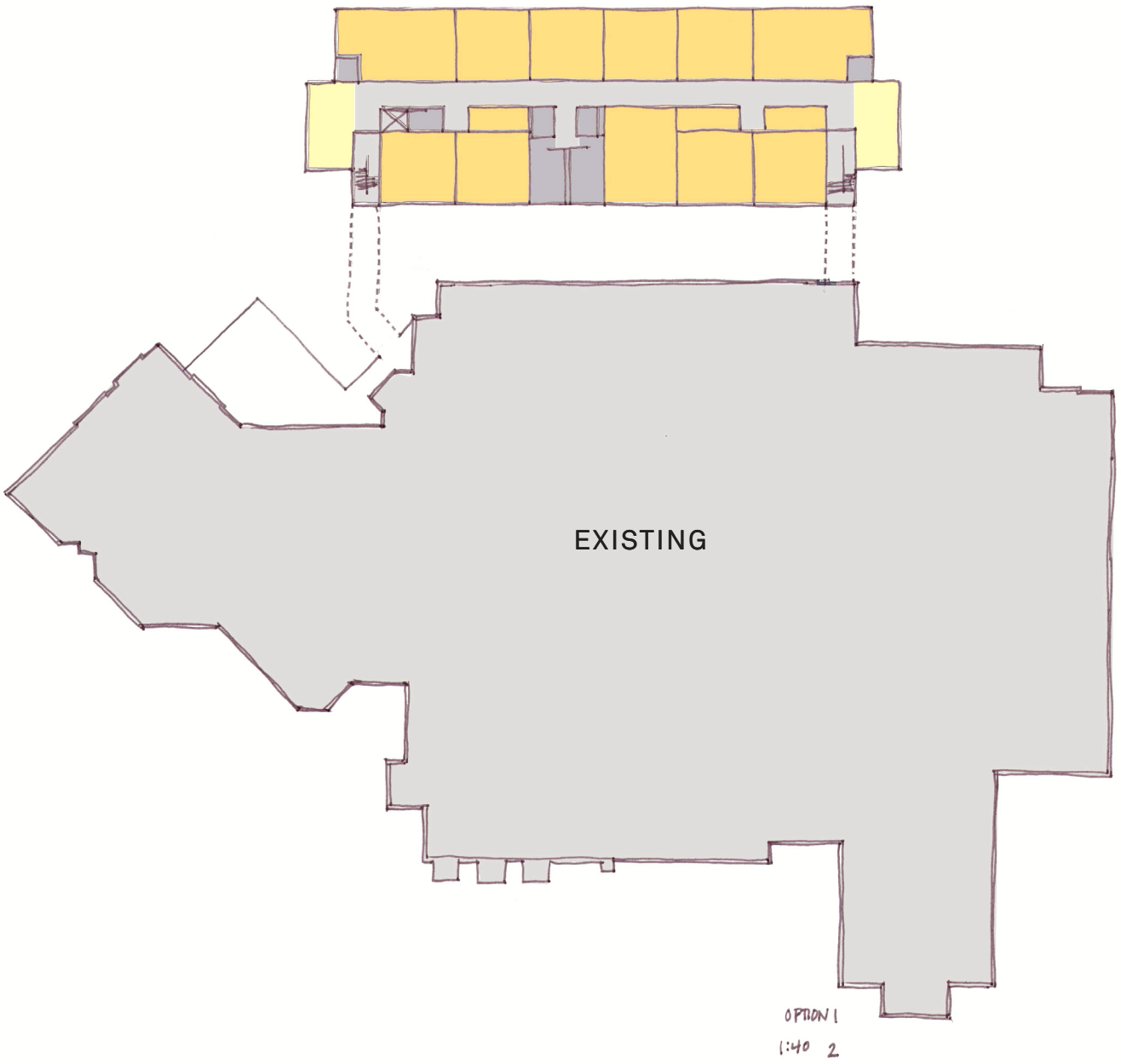

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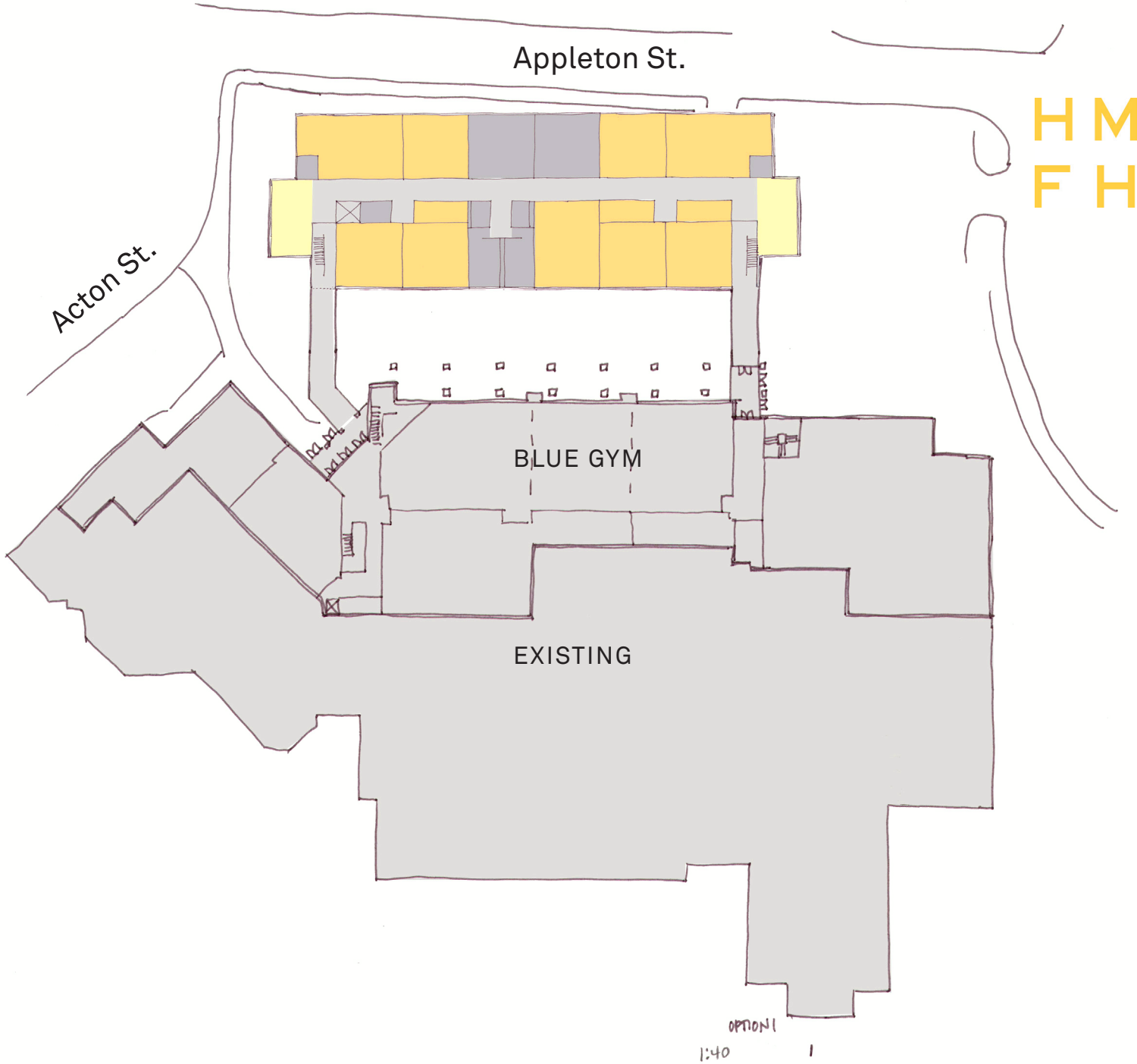

OTTOSON SCHOOL
SECTION

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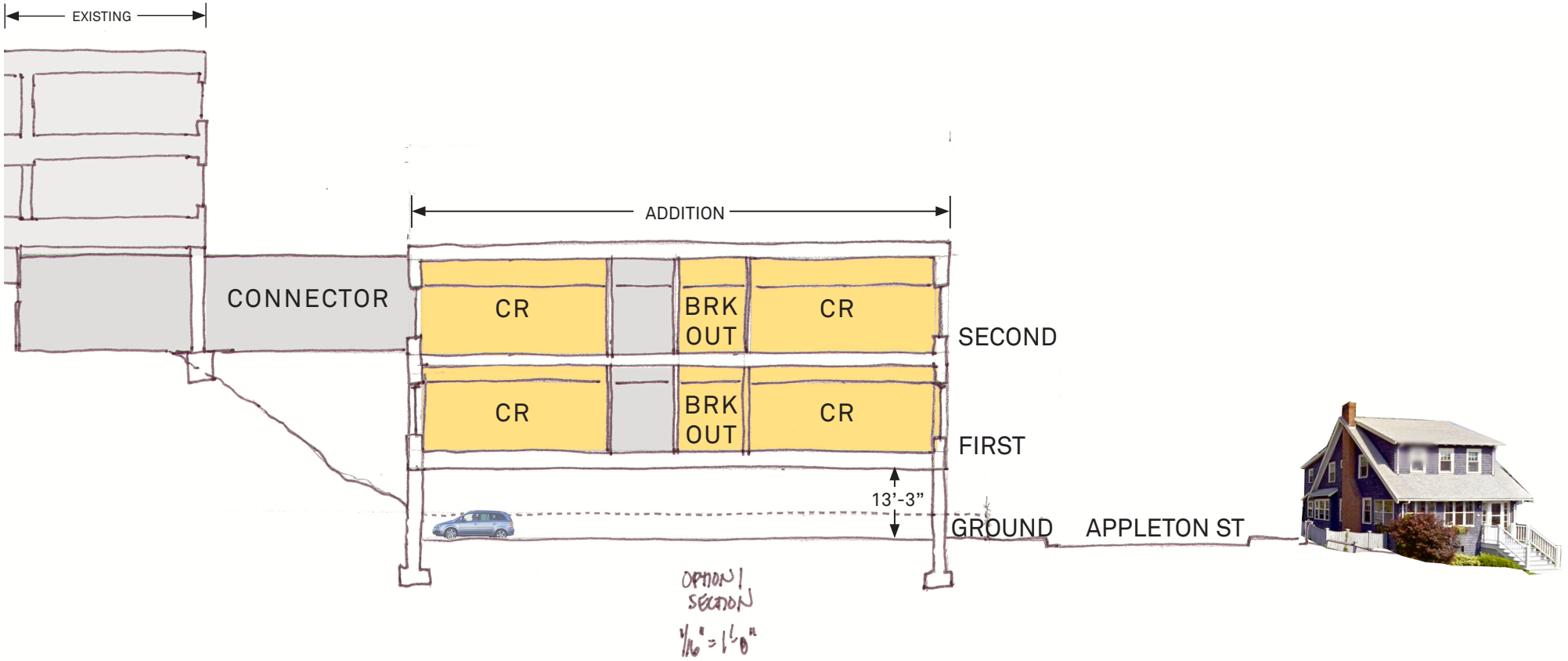

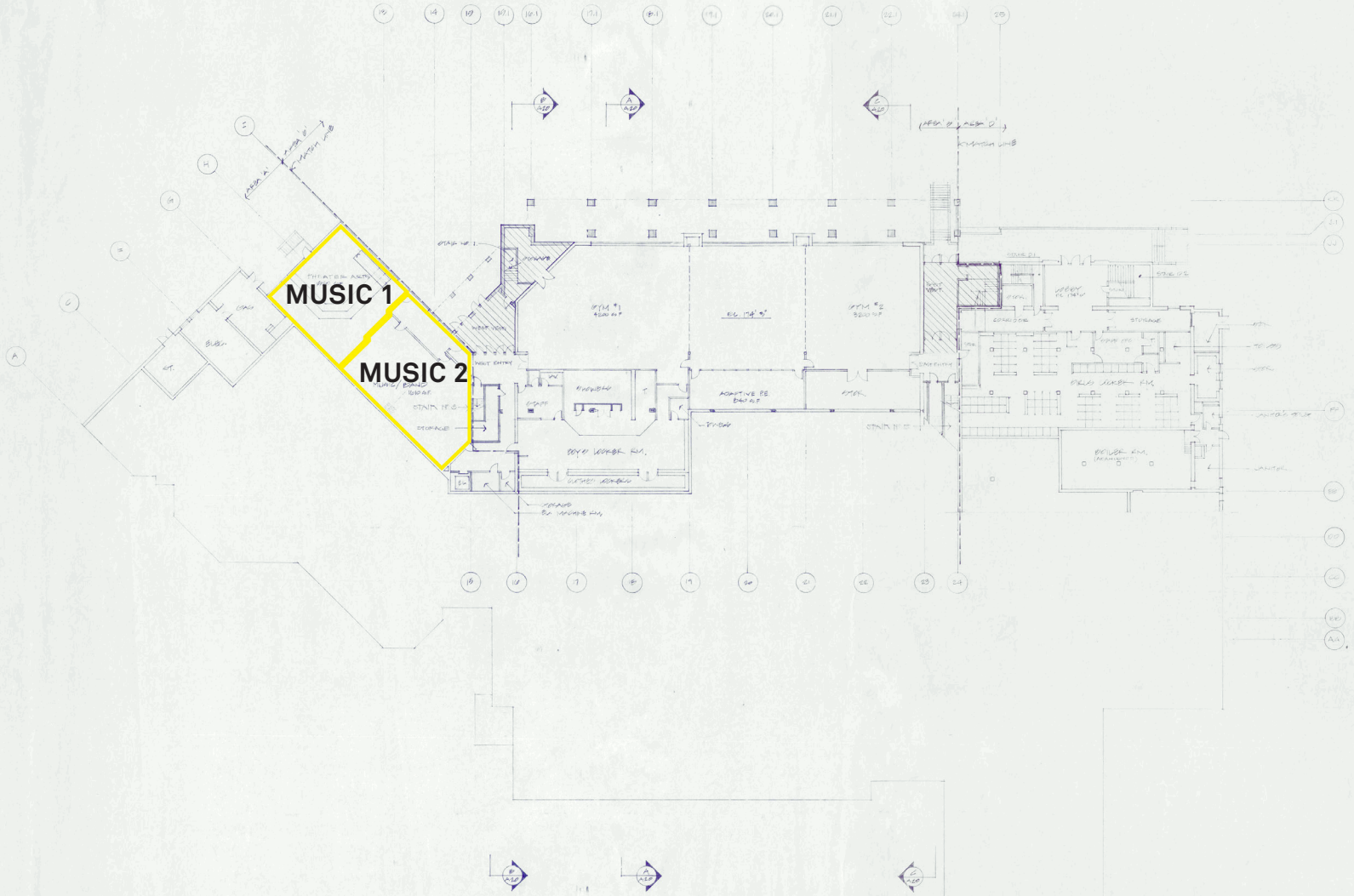

SHARED

CORE

SPEC/SUPT

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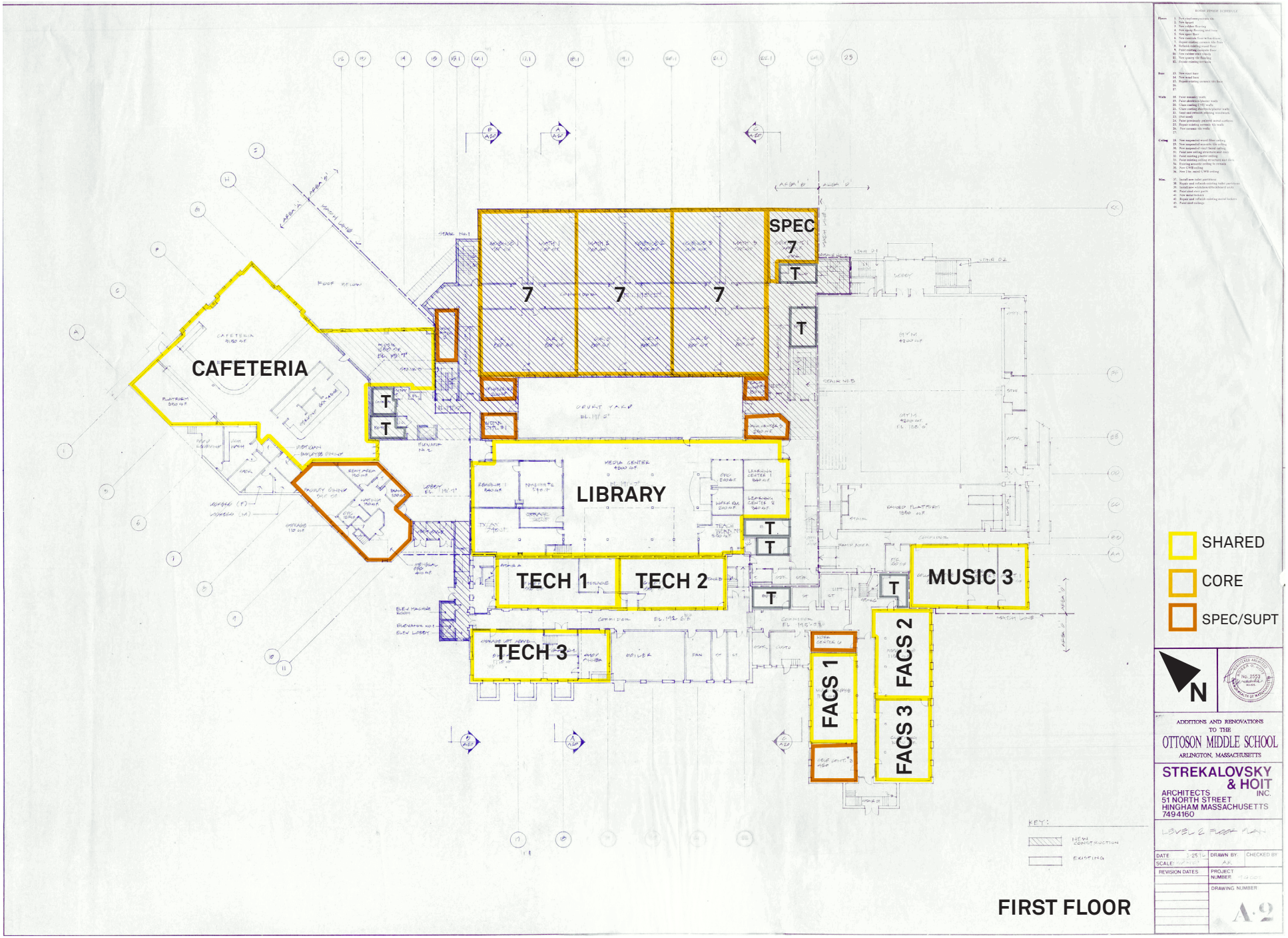
ADDITIONS AND RENOVATIONS
TO THE
OTTOSON MIDDLE SCHOOL
ARLINGTON, MASSACHUSETTS

STREKALOVSKY & HOIT ARCHITECTS INC.
51 NORTH STREET
HINGHAM MASSACHUSETTS
749 4160

DATE: 5.27.16 | DRAWN BY: | CHECKED BY:
SCALE:
REVISION DATES | PROJECT NUMBER
DRAWING NUMBER: A-1

LOWER LEVEL

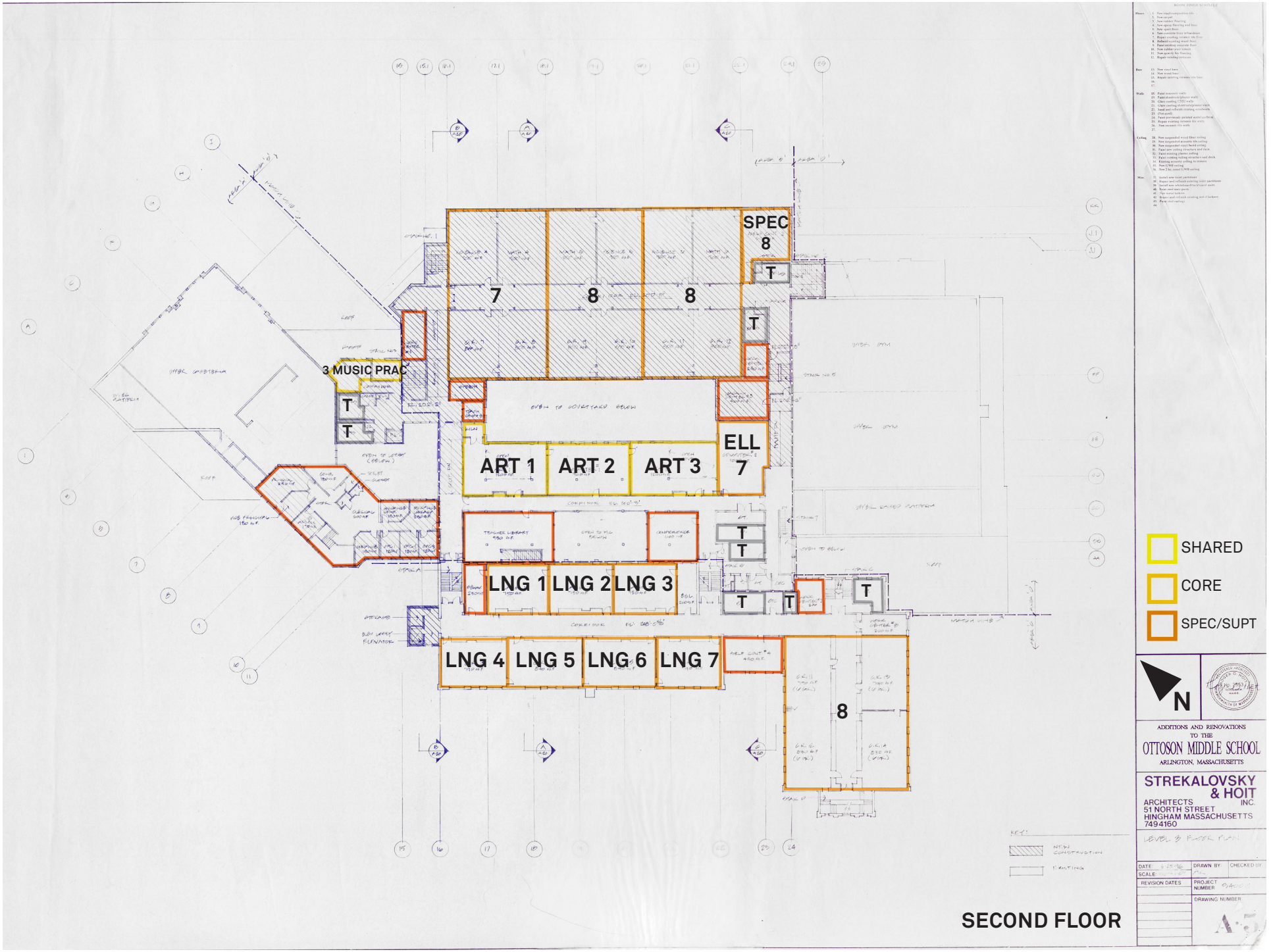


ADDITIONS AND RENOVATIONS
TO THE
OTTOSON MIDDLE SCHOOL
ARLINGTON, MASSACHUSETTS

STREKALOVSKY & HOIT INC.
ARCHITECTS
51 NORTH STREET
HINGHAM MASSACHUSETTS
7494160

LEVEL 2 FLOOR PLAN

DATE: 3-25-14 | DRAWN BY: AR | CHECKED BY:
SCALE: 1/8"=1'-0"
REVISION DATES | PROJECT NUMBER: 1314.01
DRAWING NUMBER: A-2



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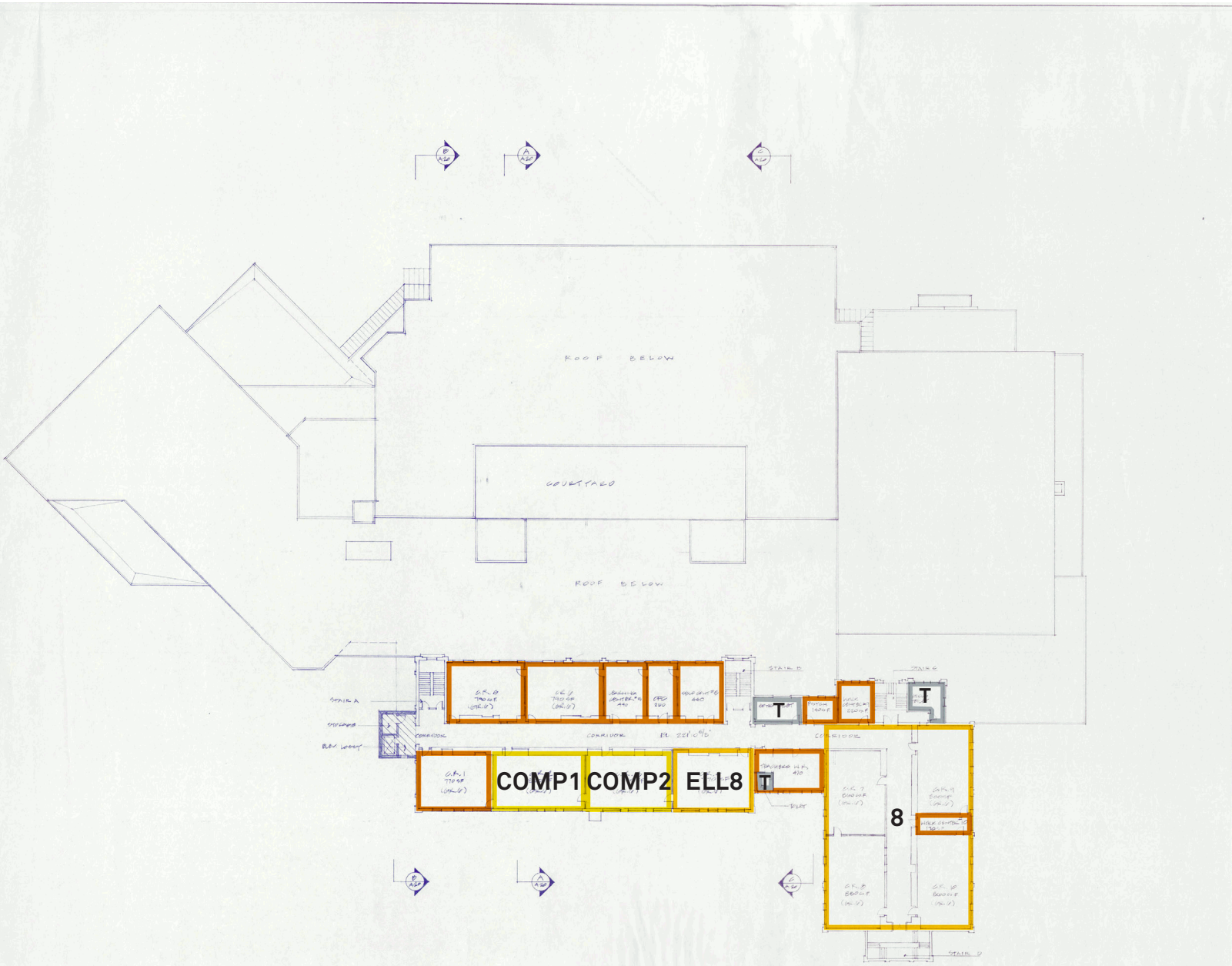

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ADDITIONS AND RENOVATIONS TO THE
OTTOSON MIDDLE SCHOOL
ARLINGTON, MASSACHUSETTS

STREKALOVSKY & HOIT INC.
ARCHITECTS
51 NORTH STREET
HINGHAM MASSACHUSETTS
7494160

LEVEL 4 PLAN

DATE: 5.25.16 | DRAWN BY: | CHECKED BY:
SCALE: 1/8" = 1'-0"
REVISION DATES
PROJECT NUMBER 34006
DRAWING NUMBER: A-4

THIRD FLOOR

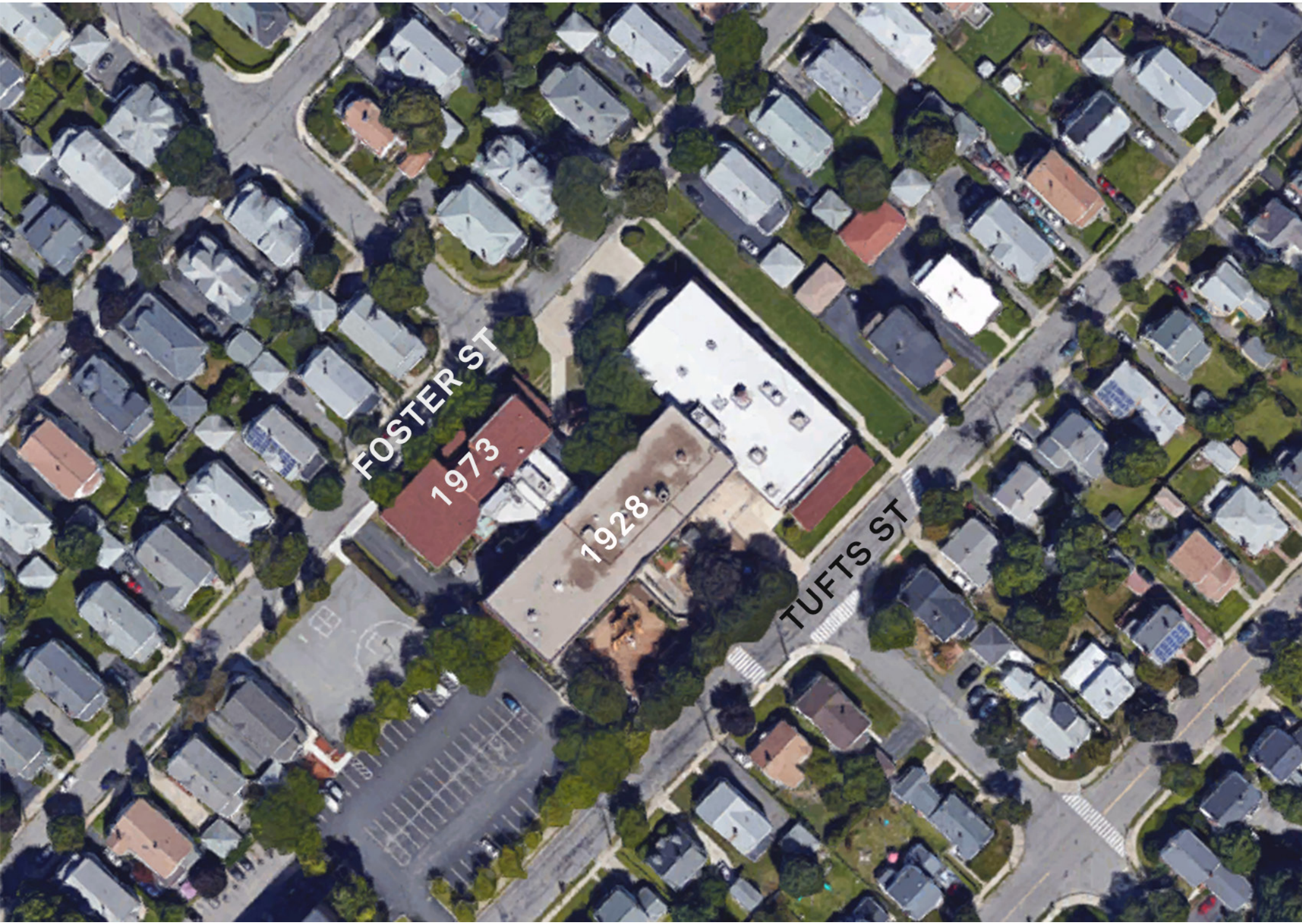
HMFH ARCHITECTS

GIBBS STUDY FOR RENOVATIONS

ARLINGTON, MASSACHUSETTS

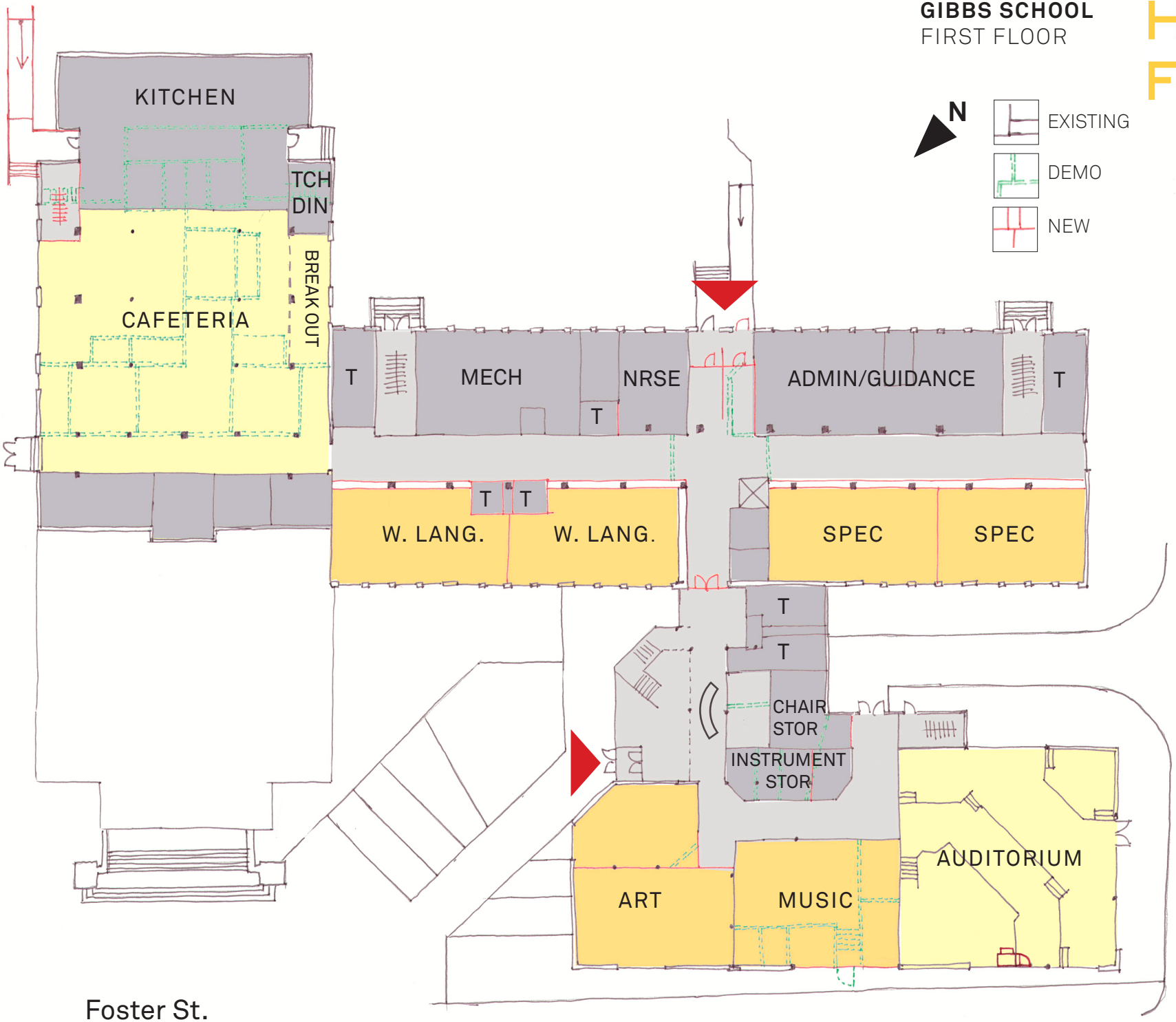
Lori Cowles, AIA Principal

April 28, 2016


FOSTER ST
1973
1928
TUFTS ST

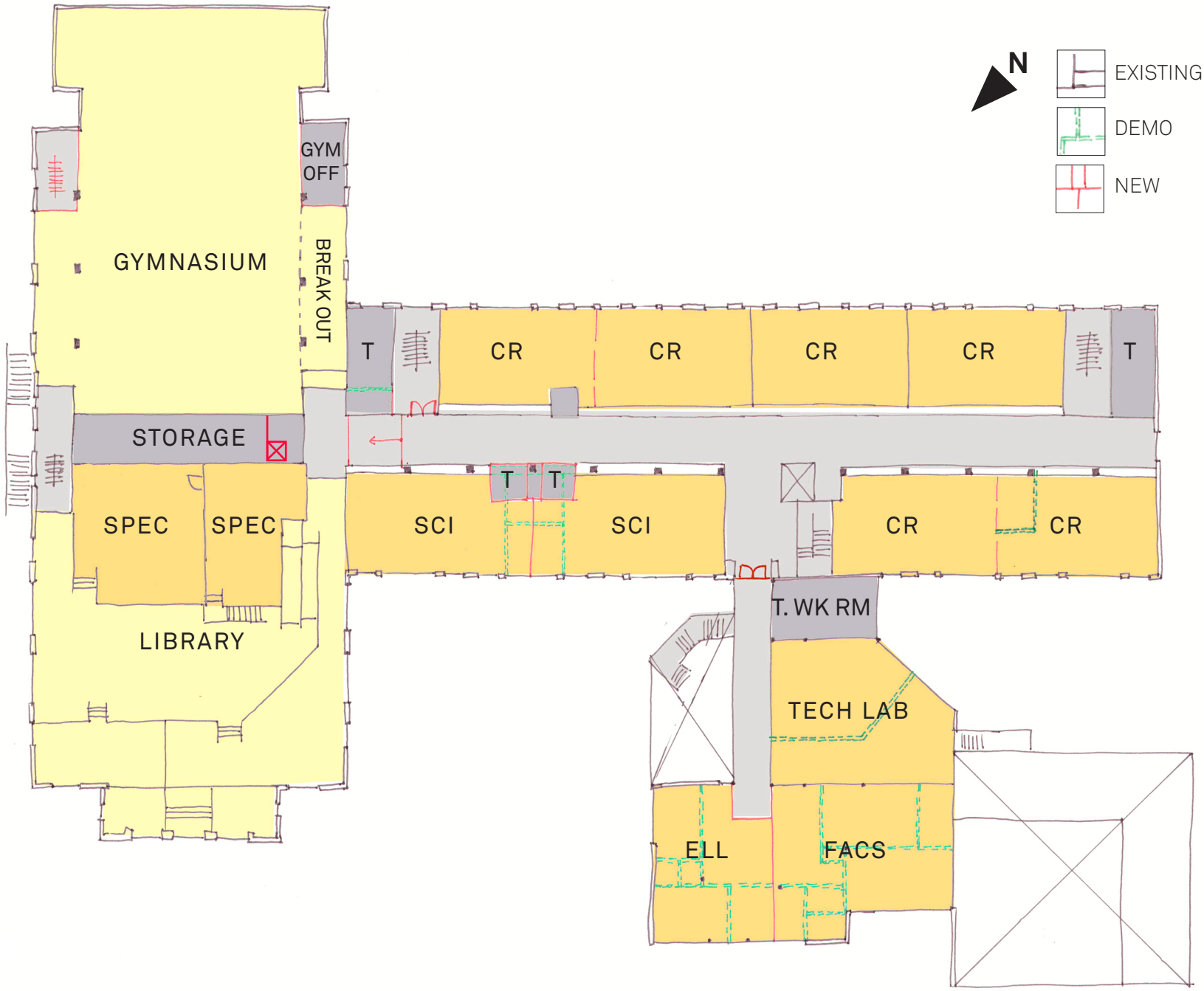
GIBBS SCHOOL
FIRST FLOOR

HMFH



GIBBS SCHOOL
SECOND FLOOR

HMFH



GIBBS SCHOOL
THIRD FLOOR

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EXISTING

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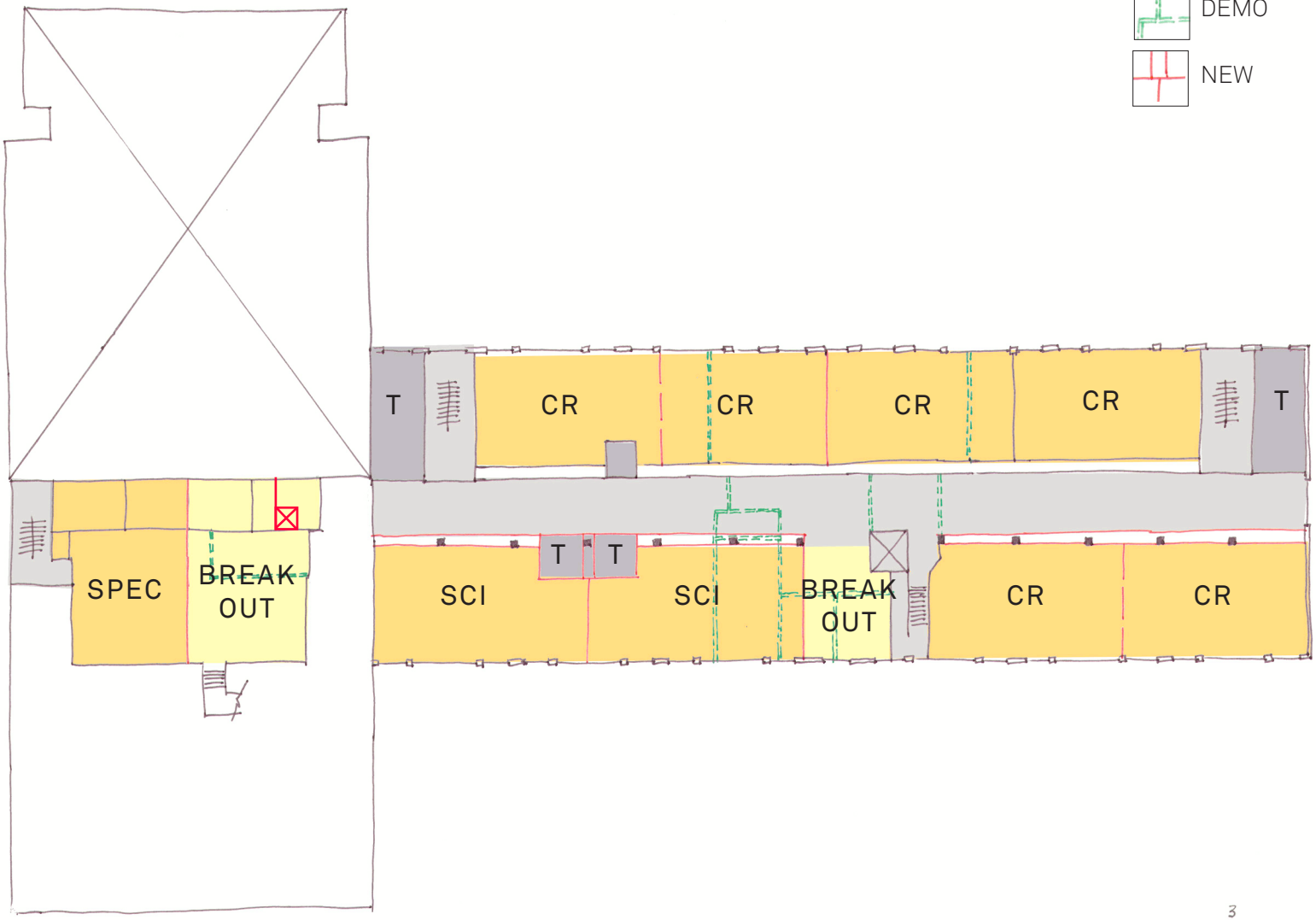

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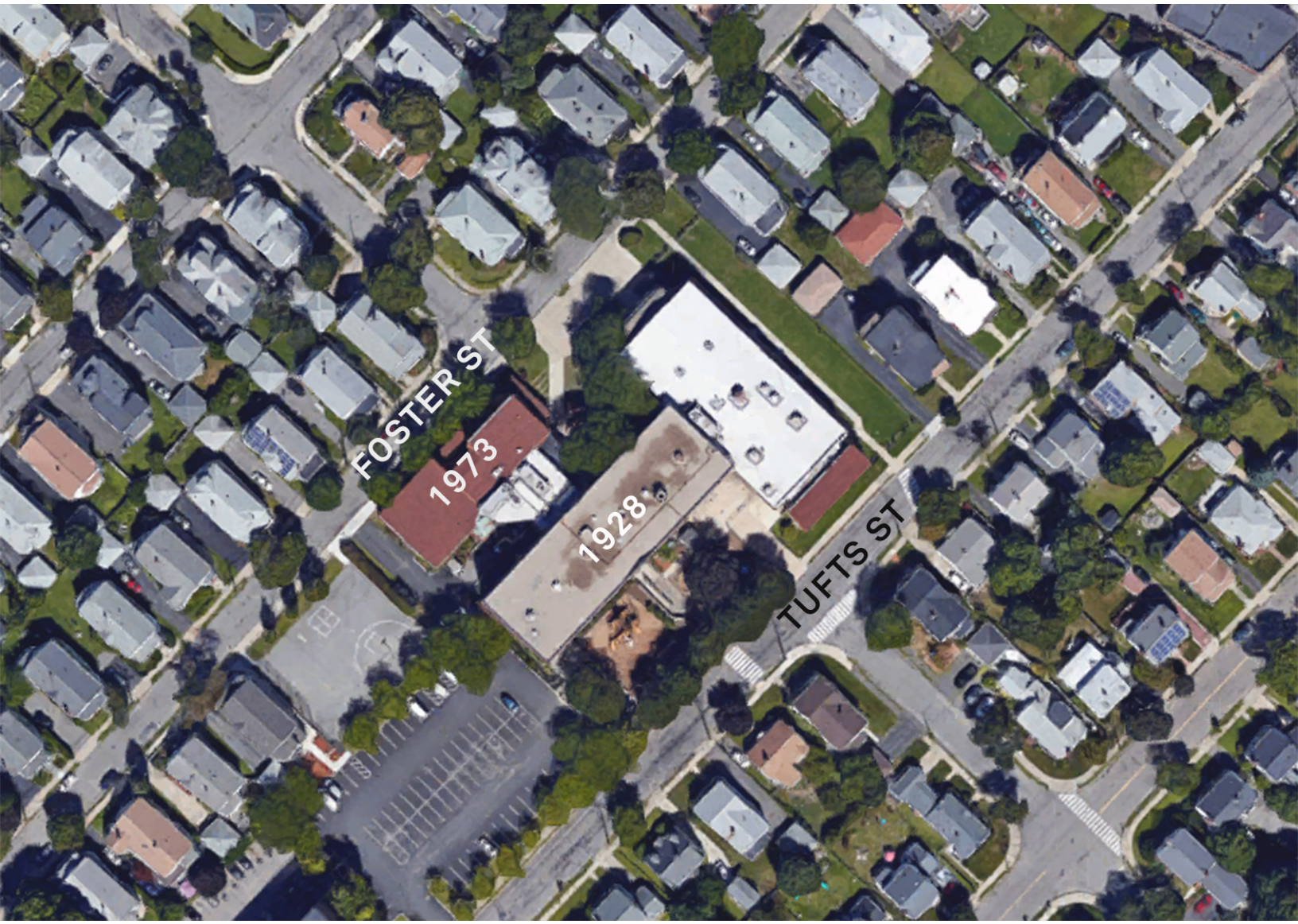
GIBBS
STUDY FOR RENOVATIONS
ARLINGTON, MA

APRIL 25, 2016



HMFH ARCHITECTS

130 Bishop Allen Drive, Cambridge, MA 02139 617 492 2200 hmfh.com

Table of Contents

Acknowledgement

Study Team

HMFH Architects, Inc. Architect
Foley Buhl Roberts & Associates, Inc. Structural Engineer
Bala/TMP Engineers MEP/FP Engineer
PM&C, LLC Cost Estimator
Universal Environmental Consultants Hazardous Material Consultant

Introduction

The former Gibbs/East Junior High School is located at 41 Foster Street on a 2.65-acre parcel of land. It is located in a residential neighborhood of East Arlington and is accessed from both Foster Street and Tufts Street. The building was originally constructed in 1928 and added onto in 1973 and is approximately 69,000 square feet in total. The school building was used by the Town until 1989, and since that time has been leased to non-profit organizations and Lesley Ellis School. The building's use designation per zoning has remained "educational". The structure is two and three floor levels, the parking lot accommodates 64 cars, and there are play structures on site.

The middle school is currently crowded and its student population is projected to increase. The intent of this study is to define an educational program for the renovation of Gibbs, develop renovation floor plan diagrams, review the building condition inclusive of structure, systems, and finishes, identify code-related items that would require remediation and hazardous material that would require abatement. This report includes renovation floor plan diagrams and scope narratives used together by a cost estimator to develop a study-level cost estimate.

Educational Program

It has yet to be determined as to whether the school, once renovated, would become a single grade school (accommodating all of the sixth grade) or if it would be a second, smaller, middle school for the community. At its upper most limit the building may accommodate 500 students. The proposed space program and layout was developed with the School Administration and for this study purpose includes four academic pods, specialist spaces, break out areas, shared use spaces, and support spaces. Refer to Appendix A for the Renovation Space Program and refer to Appendix B for the Floor Plan Diagrams.

Renovation Architectural Scope

Exterior:

The masonry exterior is in good condition considering its age and only minor repointing is required. The windows at the 1928 building are double-glazed with a warm-edge spacer between the panes of glass and are in good condition. In many instances the bottom sash has been removed to accommodate window air conditioning units. The sashes are stored in the basement storage room adjacent to the Boiler Room, but for purposes of this study estimate it is anticipated that new sashes are required. The windows at the 1973 addition are single-glazed and require replacement. The curtainwall glazing and entry system at the 1973 addition is to be replaced in its entirety. Renovation to include all new exterior doors and hardware.

The roofs of the two wings of the 1928 building are in good condition, one replaced approximately 12 years ago and the other replaced five years ago. Skylights have been either removed and/or covered over and have no noticeable or reported leaks. The roofs at the 1973 addition require replacement, assume replacement to match existing shingled roofing material. No visible leaks were noted at either of the large unit skylights at the 1973 wing. There is no reasonable access to the roof top equipment at the 1973 wing and it is necessary to add a vertical ladder from grade that is secured from unlawful access.

Water damage is visible at the interior of the exterior wall facing Tufts Street at the top floor; remove this portion of wall, inspect and repair as necessary, and install new interior wallboard.

The building has two accessible entries, one from Foster and the other from Tufts Streets. The exterior concrete landings at the two main stairs at either end of the classroom wing are to be enlarged. A new exterior ramp is required to access the lower level of the Gym wing located off of Tufts Street.

Site drainage issues on either side of the 1973 wing have been identified. On repeat occasions the site drainage system has been overwhelmed and backups have resulted in water infiltration at the first floor level

at the floor drains. Increased maintenance of the exterior drains has improved the situation. Further investigation will be required, but based on the Town Engineer's assessment, at minimum the existing drainage route (that takes the water under the building) is to be capped and rerouted. Drain lines directly routed and connected to lines in Foster Street are required at either side of the 1973 wing to move the water away from the building. Additionally, revised site grading is required in order to promote positive drainage away from the building. Along with the new roofing at the 1973 wing, new gutters and downspouts are to be designed to move the water away from the building and its entry points.

The parking lot, in conjunction with on street parking, is presumed adequate. There are 64 parking spaces in total, including designated accessible parking spaces. The existing play structures are to be removed and a minimal amount of site clean-up at the Tufts Street side is required.

Interior:
Space reconfiguration is required to accommodate new educational programs, but because the building was designed as a school most of the major spaces exist already or simply require reinstallation of previously removed walls. These spaces include general Classrooms, the Gymnasium, Library, and Auditorium. The one major proposed change to the interior configuration is to demolish all the masonry and drywall partitions at the lower level (below the Gymnasium) to provide a new Cafeteria and Kitchen. Additionally, drywall partitions within the 1973 addition are to be removed to accommodate shared use programs. The Renovation Floor Plan diagrams indicate with dashed lines the walls to be removed, refer to Appendix B.

The majority of the vertical (stairs) and horizontal (corridor) circulation are adequate in size and location. Two inadequate stairs (too narrow and do not meet code requirements) that lead from the Gymnasium to the lower level are to be demolished and one new stair is to be constructed. The ramp at the second floor of the classroom wing does not meet current accessibility code requirements and will need to removed and reinstalled. The locations and size of the various student toilet rooms are adequate, but require upgrades to meet access and building codes. There are no adequate adult toilet facilities, the renovation diagrams provide proposed locations for new adult accessible toilets. The Auditorium platform is not accessible and a lift is required. The Auditorium layout is tiered, the lower tier is accessible from the corridor and the upper tier is accessible from the exterior. This is an unusual arrangement by today's standards and not how it would be designed if built today. It is anticipated that a variance request may be approved for this existing condition.

Renovation to include all new interior doors with all new door hardware.

The building will require all new interior finishes including:
Flooring: linoleum floor tiles typical throughout, ceramic tile in toilet rooms, carpeting in library and auditorium, fluid-applied flooring at new kitchen, rubber flooring at stairs, no work at existing gymnasium wood floor
Walls: paint new and existing, wall tile in toilet rooms
Ceilings: acoustic ceiling tiles typical throughout, newly exposed ceiling at gymnasium to have spray acoustic treatment
Specialties: marker board/ tack boards at all teaching spaces; new room signage throughout; new toilet compartments and accessories at all toilet rooms; new operable partitions between classrooms at four locations shown on drawings; assume 20 new fire extinguishers; new metal double height, 12" wide lockers, double-height unit quantity =250 for a total of 500 individual lockers
Equipment: new full service kitchen; no new gym equipment
Furnishings: new perforated roller window shades; typical classroom manufactured casework includes sink counter/cabinet and one tall storage; typical science classroom manufactured casework includes six sinks/counter/cabinets and two tall storage units; art and FACS classrooms manufactured casework includes three sinks/counter/cabinets and two tall storage units; nurse's suite manufactured casework includes one sink/counter/cabinet; new entry mat series at two main entries

Conveying Equipment: replace elevator cab and mechanism

Renovation Mechanical, Electrical, Plumbing, Fire Protection Scope

See **Appendix C** for the complete MEP/FP assessment and proposed renovation scope requirements. Additionally, two mechanical options are developed to provide partial cooling and/or conditioned air to the school building and are included in the study cost estimate.

Renovation Structural Scope

See **Appendix D** for the complete structural assessment and proposed renovation scope requirements.

Hazardous Material Scope

See **Appendix E** for the hazardous material investigation survey report and scope requirements.

Conclusion

A Feasibility Study Estimate developed from the information and scope provided in this report is included in **Appendix F**. The construction cost equals $16.6 million, applying a 20% factor for soft costs (design, investigation, testing, etc.), the estimated total project cost is $19.9 million.

Appendix A

Space Program

Renovation Space Program

	Room Type	SF	# of Rms	Area	Notes
*	General Classroom	750	12	9,000	
*	Science Classroom	900	4	3,600	
*	Break out	280	2	560	
*	Break out	350	1	350	
*	Break out	520	1	520	
*	ELL	800	1	800	
*	Specialist Room	880	1	880	
*	Specialist Room	750	1	750	
*	Specialist Room	600	1	600	
*	Specialist Room	480	1	480	
*	Specialist Room	570	1	570	
*	Specialist Room	100	3	300	
	Art (incl. storage)	1,430	1	1,430	
	Music	1,200	1	1,200	
	Instrument Storage	310	1	310	
	World Language	900	2	1,800	
	Technology Lab	1,080	1	1,080	
	FACS	1,210	1	1,210	
*	Gymnasium	4,700	1	4,700	
*	PE Other	280	1	280	along side of court
	PE Office	145	1	145	
	PE Storage	400	1	400	
	Library	3,080	1	3,080	incl 2-140 SF office spaces
	Cafeteria	3,800	1	3,800	2 lunch periods
	Kitchen	1,500	1	1,500	
	Teacher Dining	145	1	145	
	Auditorium (incl. platform)	2,500	1	2,500	
	Chair Storage	260	1	260	
*	Administration	1,000	1	1,000	
*	Guidance	550	1	550	
*	Nurse	420	1	420	
*	Teacher Workroom	280	1	280	
*	Building Storage	840	1	840	
	TOTAL NET SQUARE FEET			45,340	
	Net-to-Gross Factor			1.52	
	TOTAL GROSS SQUARE FEET			69,000	

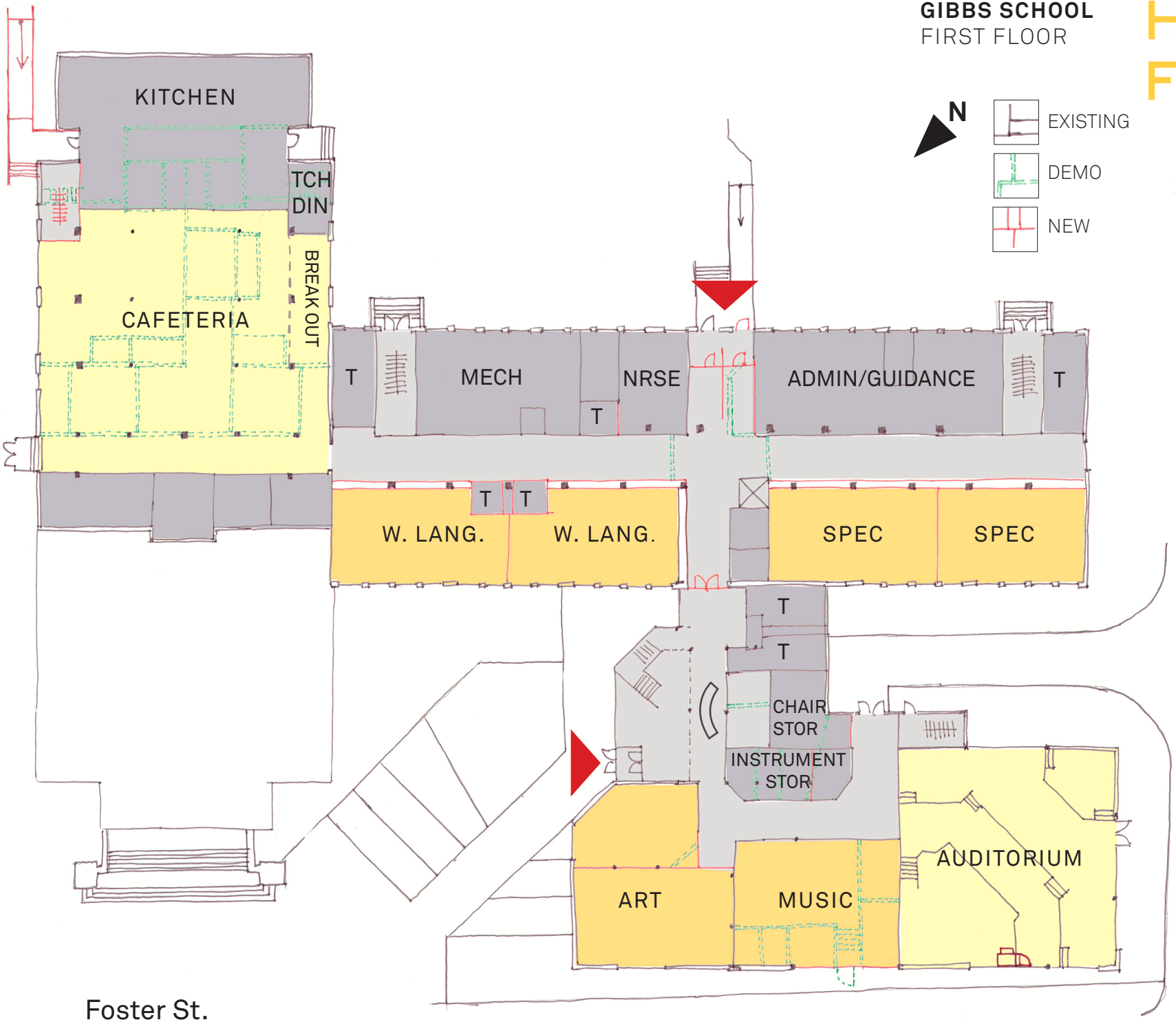
* Note:
Net Square Foot Comparison To Ottoson Addition: 25,640

Appendix B

Floor Plan Diagrams

GIBBS SCHOOL
FIRST FLOOR

HMFH



GIBBS SCHOOL
SECOND FLOOR

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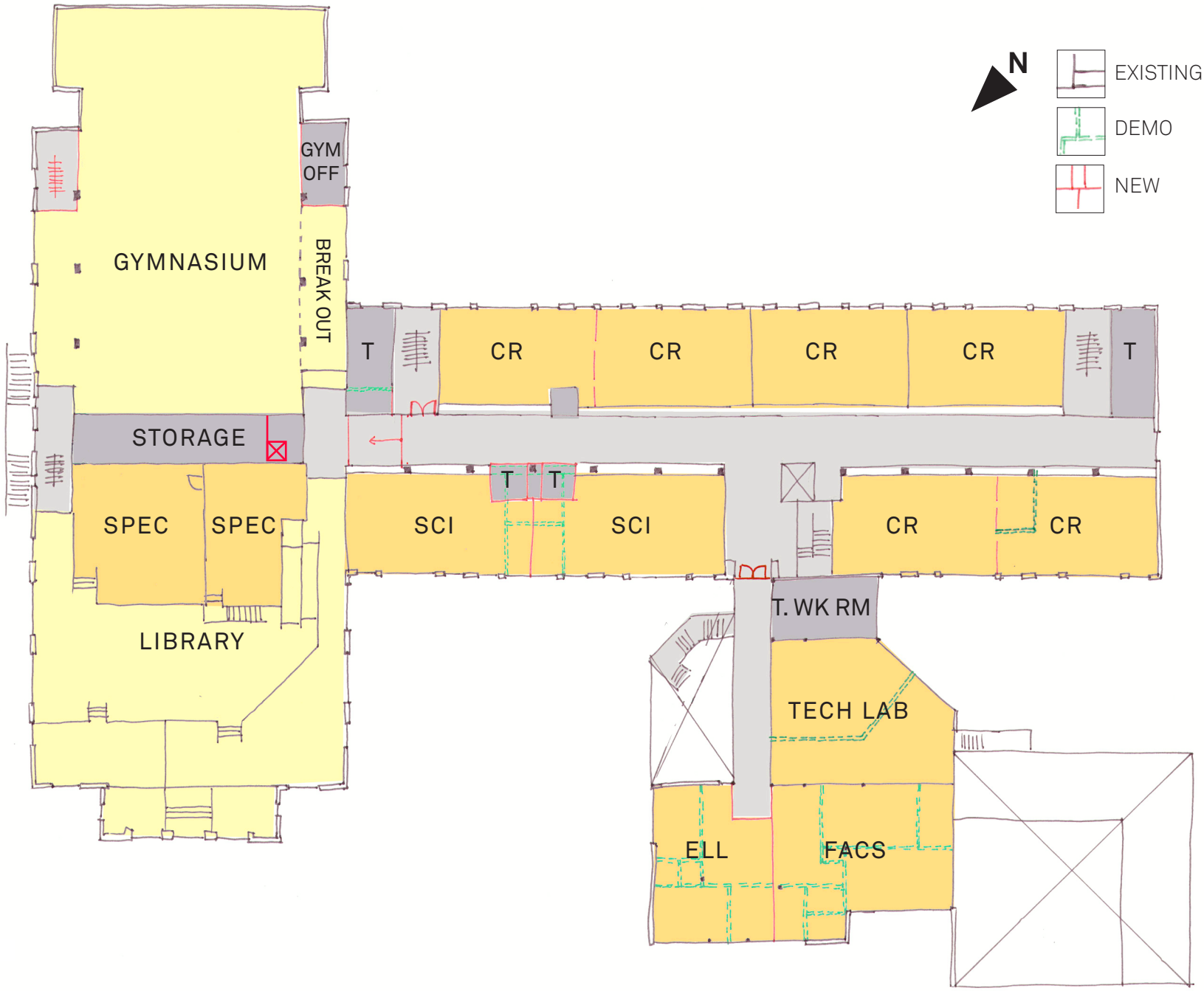

GIBBS SCHOOL
THIRD FLOOR

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EXISTING

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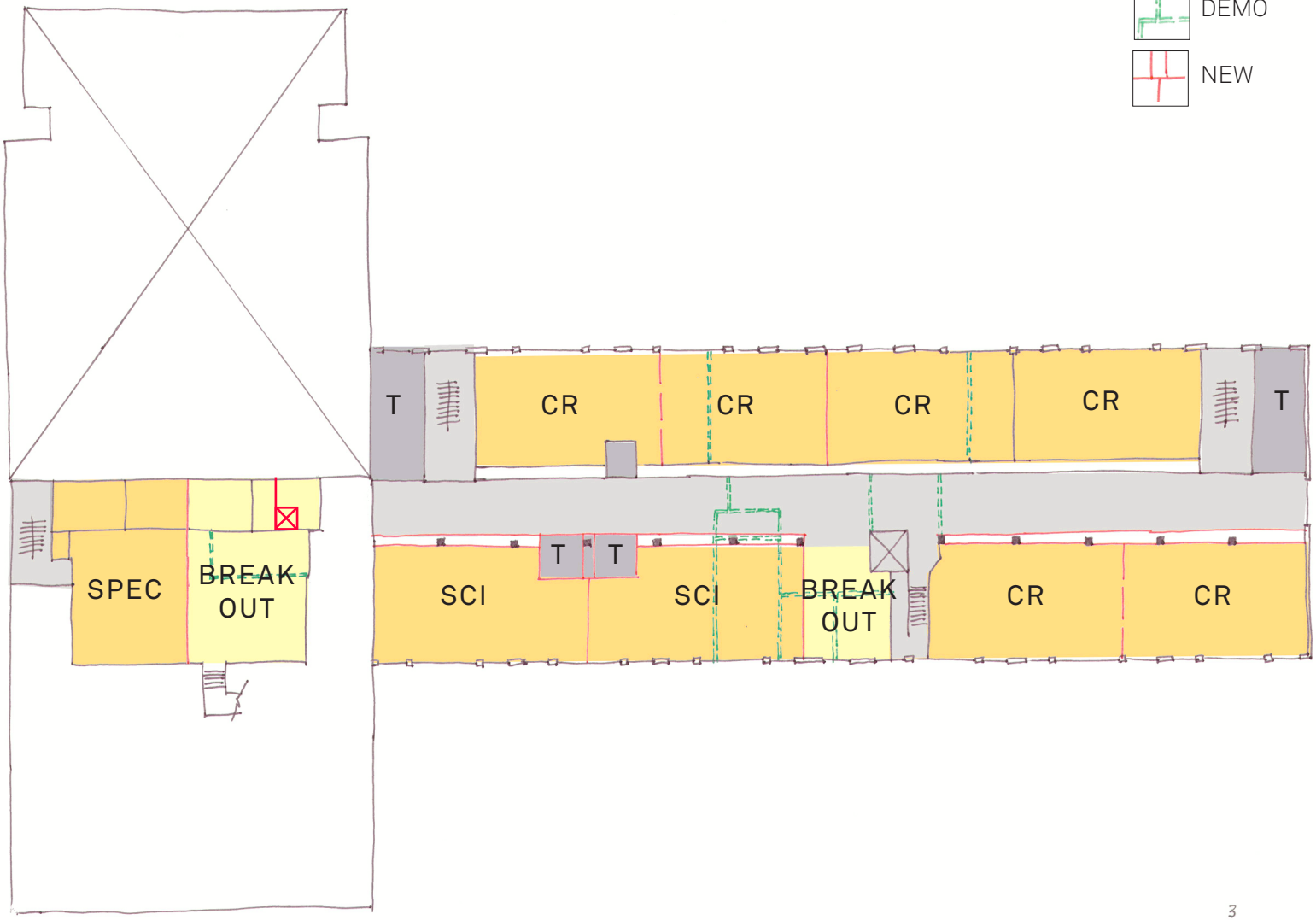
NEW



Appendix C

Existing Conditions &
Recommendations for
MEP/FP Systems

ARLINGTON GIBBS SCHOOL

EXISTING CONDITIONS REPORT AND RECOMMENDATIONS FOR MEP/FP SYSTEMS

I. HEATING, VENTILATING, AND AIR CONDITIONING

A. General:

1. This report is intended to give an overview of the HVAC systems. The information contained is a result of a survey of the building on 3/24/16 and a review of the existing HVAC plans prepared by Drummey, Rosane and Anderson dated 3/7/73. These plans were H-1 through H-5. This project was an addition/ renovation to the existing Junior High School East.

2. The 1973 addition/renovation replaced some of the original equipment and reused some of it. There is no way of determining the exact age of the equipment that was not replaced in 1973 as some of it was probably replaced between the 1928 original construction and 1973 renovation. As the 1973 equipment is now 43 + years old and beyond its useful life, the same applies for anything earlier than 1973.

B. Heating:

1. The building is heated from a central gas-fired steam boiler. The original oil tank is still inside a vault. It is not known if it has any fuel in it. This should be verified.

   New steam to hot water convertors and associated hot water pumps were installed in 1973 to provide a hydronic heating system for the addition.

2. Three packaged rooftop units (installed in 1973 with steam coils and replaced in 1996) have gas-fired furnaces. Otherwise all heating is from a five-year old steam boiler (Burnham Model #V1123, 3653 MBH steam/4142 water 1BR ratings, Serial #65212616). There is a second boiler that is a standby. It appears to be earlier than 1973 vintage. Burner was converted from oil to gas in the standby boiler.

3. Existing steam radiation used to heat the individual spaces was reused in much of the original building. The new radiation for the addition was a mix of hot water and steam.

C. Ventilation:

1. Ventilation is provided by classroom unit ventilators (pre-1973 vintage), two ceiling recessed gymnasium ducted unit vents and 1973 locker room and exercise room steam unit vents, 22 exhaust fans (according to drawing schedules), gravity ventilators in gym, and three rooftop units. Only some of the unit vents are still operational. It appears that most of the horizontal ductwork was replaced in 1973 but the vertical risers were not replaced.

2. Four existing rooftop gravity ventilators were left in place but duct systems were blanked off.

D. Controls:

1. Controls are pneumatic. Existing compressor has been refurbished lately. Many of the steam radiators have self-contained control valves. There are sensors scattered around the building that allow reading only (no reset) of various temperature conditions at a central computer in building. Not sure if this computer is connected to a system-wide central automation system.

E. Air Conditioning:

1. Portions of the building are air conditioned. The 1973 project installed three rooftop units (two multi-zone, one single-zone) RTU-1 (32 tons); RTU-2 (37 tons) and RTU-3 (33 tons) dedicated for Auditorium. These units were replaced 23 years later in 1996. Engineering plans for these three replacement units not available at time of this report. (Owner has shop drawings.) Other areas of the building are air conditioned using window units.

2. The Auditorium unit (RTU-3) is very noisy and is often turned off, thus affecting ability to heat or cool space. It appears that the main noise is due to the proximity of the main return grille being too close to the return or supply air fan. An attenuator in conjunction with an acoustically lined return air elbow should be installed if system is maintained as is. 1973 unit had no return air fan scheduled.

3. These three units are also within three to five years of needing to be replaced. If units are reused, they need major duct reconfigurations to align with the new space layouts and/or deal with any existing noise issues.

F. Recommendations:

1. It is assumed that the intended use of the Gibbs School is long term so replacement of the HVAC systems in their entirety is recommended. There may be isolated sections of ductwork and hot water piping that may be reusable but that requires more detailed analysis.

2. The following is the proposed base system:

a. Provide a new high efficiency central heating, ventilating, and air conditioning system consisting of two gas-fired condensing hot water boilers and multiple air handling units (RTU, HRU, ERV, and MUA). Air conditioning systems will be refrigerant DX. The boiler plant will serve a hot water piping system.

1) The five year old steam boiler can be converted to hot water and a second condensing type hydronic boiler could be added to increase building efficiency. Also possible that five year old boiler could be reused in another building if the desire is to make this building as efficient as possible.

2) The base heating and ventilating system serving standard perimeter classrooms will be served by 100% dedicated outside air heat recovery (HRU) units. The heat recovery units will deliver a constant (adjustable) neutral temperature to classrooms at the Classroom Wing. Classrooms will be heated by fin tube radiation controlled by room thermostat. HRU units will be zoned by exposure for maximum comfort.

3) Classrooms will not be air conditioned; however, any interior occupied spaces will be.

4) The new hot water boiler system will be selected for approximately 67% backup capacity should one boiler fail. Condensing boilers utilize low temperature supply water (140°F) which requires larger heating terminal units: Fin tube radiation will be two-rows high and hot water coils will have multiple rows. The hot water system will be charged with 30% glycol solution.

   a) Provide new stacks for each boiler and domestic hot water heater.

5) Base design air conditioning will be provided to Administration/ Health Suite, Main Lobby, Media Center, Cafeteria, Gymnasium and Music Area, Head End Room, Auditorium, and interior occupied spaces. Air conditioned spaces will be conditioned to 75°F during cooling season and all occupied spaces will be heated to 72°F during heating season. Unoccupied cooling season temperatures are not controlled as equipment is off. Unoccupied heating temperature will be 60°F (+/-) adjustable.

   a) See descriptions of alternates for additional air conditioning options for classrooms.

6) The following summarizes the air handling systems to be provided for the various occupied building areas and spaces:

   a) Classrooms will be ventilated by the heat recovery units located at the Classroom Wing roof. The units will be furnished with outside air and exhaust fans, heat recovery wheel, hot water heating coil, and MERV 13 filters. The unit fans will be furnished with VFD's.

   b) The Gymnasium/Assembly space, Cafeteria, and Library will each be air conditioned by a dedicated packaged VAV RTU system with integral air cooled condensing unit located at the roof. The unit will be furnished with supply and return fans with variable frequency drives, full economizer, DX cooling coil, hot water heating coil, and MERV 13 filters.

   c) The Administration Area, Main Lobby, Health Suite, and interior rooms will be air conditioned by a VRF/FCU system, including indoor fan coil units, outdoor air cooled condensing unit (heat recovery type), refrigerant piping and controls. All spaces served will be ventilated by an energy recovery ventilator (ERV) roof mounted. The unit will be provided with an integral air cooled condensing unit and DX coil in addition to supply and exhaust fans, hot water coil, and energy recovery wheel, in order to provide conditioning of outside air for spaces subject to higher occupancy rates. Exterior spaces will be provided with fin tube radiation interlocked with the fan coil units.

d) Music and Art Area will also be air conditioned by a VRF/FCU system similar to that serving Classroom Wing areas above. Ventilation for these spaces will be provided by an energy recovery ventilator (ERV) located at the roof.

e) The Head End Room will be served by a dedicated air conditioning split system, including fan coil unit, air cooled condensing unit at the roof connected to refrigerant piping and controls.

f) The kitchen will be served by a make-up air handling unit located at the roof. The unit will provide 100% outside air for ventilation of the kitchen and for kitchen exhaust hood make-up air. The unit will be furnished with supply fan, indirect gas-fired furnace, and controls.

g) Corridors will be generally provided with code mandated ventilation air and are typically not air conditioned with the exception of areas that have direct or excessive solar loads.

h) Exhaust systems will be provided for toilet rooms, electric rooms, Janitor's Closets, Kiln Hood, Science fume hood(s), etc. which will be ducted to either dedicated roof-mounted exhaust fans or to the HRU and ERV exhaust fan where applicable.

i) The kitchen hood will be provided with a dedicated roof mounted kitchen exhaust fan designed for grease exhaust system application. The motor will be two-speed to allow for cooking and non-cooking modes of operation.

j) Building Management System (BMS) shall be a direct digital control (DDC) automatic temperature control (ATC) system (WEB based). Main DDC panels shall control all HVAC systems and shall perform day/night scheduling for all unitary equipment.

k) It is assumed that there will be no three-story atrium requiring smoke management.

G. HVAC Alternates:

1. Alternate HVAC-1: Add DX cooling coils and integral air cooled condensing units to heat recovery units to provide partial cooling for classrooms. Spaces will be tempered (not fully air conditioned at maximum design temperatures which seldom occur) but will provide baseline cooling and partial dehumidification.

2. Alternate HVAC-2: Provide classrooms with displacement ventilation system. This system will provide partial cooling and dehumidification also. This system requires more ductwork as displacement ventilation requires supply ducts dropping down to floor level and discharges air in a large sidewall supply outlet at low velocities along floor. Air quantities are greater in this option, as air is delivered at higher temperatures. A major benefit of this system is improved air quality.

II. FIRE PROTECTION

A. General:

1. The Fire Protection Section is intended to provide an overview of the water-based system in the existing building. Information has been obtained via field survey and a review of the Plumbing plans prepared by Drummey Rosane Anderson dated March 7, 1973. Drawings are numbered P-1 through P-7 and that project was a renovation and addition to the existing Junior High School. Fire Protection systems referenced below were installed at that time.

2. The building "Fire Standpipe" system is served by a 6 inch tap off of the 10 inch municipal water main in Tufts Street. Buried service piping enters the Boiler Room from the south and is equipped with a shut-off valve and waterflow alarm switch. The condition of the supervisory devices is unknown.

3. The referenced plans include 4 inch distribution piping running east/west in the Ground Floor Corridor with 4 inch risers to the first and second floors and 2-1/2 inch drops to cabinets. Fire hose cabinets are located within the Gym and in corridors, just outside egress Stairs. A two-way Fire Department connection is located on the north elevation of the new addition, facing Foster Street.

4. There are very few areas protected by Sprinklers, presumably connected to the "Fire Standpipe" piping.

5. Hydrant Flow Test Data from 1972 notes a static pressure of 96 psi, a residual pressure of 72 psi, and a flow of 5,889 gpm on Tufts Street.

B. Recommendations:

1. The building shall be fully protected with properly zoned, wet Sprinkler and Standpipe systems.

2. Pending a new hydrant flow test, it is assumed that the existing buried 6 inch service can be tested, flushed, and reused. A fire pump is not anticipated. A backflow preventer and alarm check valve shall be provided on the existing service in accordance with Code requirements.

3. The existing 4 inch distribution piping in the Ground Floor Corridor could be reused pending satisfactory pressure test results. Combined Standpipe risers shall be relocated to within the fire-rated stair enclosures and new Fire Department valves shall be provided on each floor landing. Existing fire hoses and cabinets shall be removed.

4. Sprinklers shall be provided in all occupied areas of the building and shall be supplied from a 6 inch combined standpipe. The building shall be zoned by floor and, if necessary, additional zones will be provided.

5. All Fire Protection valves shall be supervised and connected to the Fire Alarm system. Waterflow switches shall be supervised, connected to the Fire Alarm system and shall indicate the sprinkler zone in alarm.

6. All materials and installation methods shall comply with applicable Codes and Standards including the Massachusetts State Building Code, NFPA 13, NFPA 14, and NFPA 24.

III. PLUMBING

A. General:

1. The Plumbing Section is intended to provide an overview of the existing systems within the building. Information has been obtained via field survey and a review of the Plumbing plans prepared by Drummey Rosane Anderson and dated March 7, 1973. Drawings are numbered P-1 through P-7 and that project was a renovation and addition to the existing Junior High School. The bulk of the existing Plumbing systems referenced below were installed at that time.

2. The building domestic water system is served by a 4 inch tap off of the 10 inch municipal water main in Tufts Street. Buried service piping enters the Boiler Room from the south and is equipped with shut-off valves and a Municipal meter. The condition of existing copper distribution piping is assumed to be fair considering its age; insulation, where visible, is showing signs of wear.

3. Domestic hot water is currently generated by a mid-size (100 gallon +/-), gas-fired storage heater. This is a replacement for the unit installed in the 1970's, a 750 gallon tank mounted horizontally on a steel frame 8' above the Boiler Room floor. An active master mixing valve and circulator were not apparent.

4. There are two existing sanitary exits, one from the "original" building, to the southeast to Tufts Street, and one to the north toward Foster Street. A single acid waste line from the Science Classrooms exits to the north and connects to sanitary after dilution in a dedicated manhole outside. The majority of sanitary and waste piping within the building was installed in the 1970's. There is no dedicated kitchen waste system; two point of use grease interceptors are located within the kitchen, recessed in the floor. The condition of buried and above floor cast iron piping is assumed to be good.

5. There are several storm exits around the building that connect to site drainage piping or structures. Visible interior cast iron piping and roof drains appear to be in good condition.

6. The existing natural gas service is located adjacent to the buried fire and domestic water services and is fed from Tufts Street. Piping downstream of the gas meter serves the boilers, the domestic water heater and roof top units; the riser to the roof is exposed on the building exterior wall; the branch piping is exposed on the roof. Gas piping appears to be in fair condition.

7. Toilet Room plumbing fixtures and trim are generally in good to very good condition; some are accessible. Fixture counts for students and staff require review.

8. Casework plumbing fixtures and fittings are in good condition; accessible sinks were not noted.

B. Recommendations:

1. Pending a new hydrant flow test, it is assumed that the existing buried 4 inch service can be tested, flushed, and reused. A new, remote read meter and backflow preventer may be required if the Water Department deems it necessary. A pressure reducing valve with bypass on the main service is advised.

2. Pressure and material testing is recommended for existing domestic water distribution piping and insulation scheduled to remain. Replacement of existing copper pipe and fittings is advised considering its age and may be required pending

material test results (lead content). New pipe, fittings, and insulation shall be provided to suit additional and replacement plumbing fixture arrangements.

3. The existing domestic hot water plant shall be replaced in its entirety. A new, gas-fired, high efficiency storage heater, expansion tank, master mixing valves, and circulators shall be included.

4. Testing of existing above floor and buried sanitary and waste piping is recommended; deficiencies shall be addressed. New underground and above floor piping shall be provided to suit additional and replacement plumbing fixture arrangements. The existing Science Classroom waste system may be deactivated pending programming plans; abandoned concealed piping shall be capped accordingly. New kitchen waste piping shall be provided; an exterior grease trap shall be included under Site/Civil.

5. Roof drains, above floor and buried storm piping shall be tested, and any deficiencies addressed. Insulation shall be evaluated and replaced as necessary.

6. Demolition and replacement of the existing natural gas system to suit new equipment is recommended.

7. Demolition and replacement of existing Toilet Room fixtures and trim is recommended. New fixtures shall be high-efficiency and accessible as required. All piping and carriers in chases shall be replaced.

8. Demolition and replacement of existing casework fixtures is recommended. New fixtures and fittings shall be water efficient and accessible as required.

IV. ELECTRICAL

A. General:

1. This report is intended to give an overview of the Electrical systems. The information contained is a result of a survey of the building on 3/24/16 and a review of the existing electrical plans prepared by Drummey, Rosane and Anderson dated 3/7/73. These plans were E-1 through E-11. This project included an addition and renovation to the existing Junior High School East.

2. The 1973 addition/renovation replaced the majority of the original equipment and some was maintained. As the 1973 equipment is now 43+ years old and beyond its useful life, most of the existing equipment and systems should be replaced unless noted otherwise.

3. The building is approximately 70,000 square feet.

B. Electric Service and Distribution:

1. The electric service to the building was replaced per the 1973 drawings and site observations.

2. A pad mounted transformer provided a new secondary service at 208/120V 3 phase 4 wire to a 2,000A switchboard.

3. With the exception of one or two panelboards, all existing distribution equipment and panelboards were removed and replaced with new panelboards provided throughout the existing building and the new addition.

4. We anticipate there being enough capacity with the existing 2,000A 208/120V service to continue to serve the building and proposed renovations.

C. Emergency Power System:

1. A 45kW 56kVA 208/120V 3 phase 4 wire natural gas generator was installed during the 1973 renovations and addition.

2. The generator primarily serves emergency lighting throughout the existing building and addition. The system is a "NORMALLY OFF" system with panelboards located throughout the existing building and new addition. In addition, the boilers and associated circulator pumps and controls are served by the generator.

3. The following items do not meet present day code: Life safety and standby loads are served by one transfer switch, the loads share common panelboards, and panelboards are not located within two hour rated closets.

4. The generator is over forty years old and is maintained by FM Generator.

5. Bala|TMP followed up with FM Generator, the service company for the generator and note the following:

   a. The generator is 43 years old and is at the end of its serviceable life expectancy. The unit is no longer serviceable by the manufacturer and parts availability is scarce.

   b. Given the age of the equipment, it was reported that the cooling system could be near a failure, cooling system repairs range from $500 to $7,500.

   c. The unit has not been load bank tested as required by NFPA and may not be capable of withstanding the required tests.

   d. The automatic transfer switch is no longer supported by the manufacturer.

   e. Replacing the generator is recommended.

D. Lighting and Controls:

1. The majority of all lighting within the existing building was removed and replaced during the 1970s renovation and lighting throughout the existing building and addition consists of ceiling surface mounted fluorescent luminaires with acrylic wrap-around lenses.

2. Lighting in the Media Center consists of a combination of recessed one foot by four foot lensed fluorescent luminaires and recessed incandescent downlights. Many of the downlights have been retrofitted with compact fluorescent lamps.

3. Lighting in the Gymnasium consists of one foot by four foot ceiling surface mounted fluorescent luminaires.

4. The Cafetorium which is used as the Theater today consists of linear fluorescent luminaires for general lighting and track lighting for the theatrical events.

5. Lighting controls throughout the existing building and addition primarily consist of local switching within all spaces and corridors. There are no automatic control devices such as vacancy/occupancy sensors, daylight sensors, or time clock control for common areas.

6. There is illuminated exit signage. Some areas are lacking adequate coverage.

7. Exterior lighting primarily consists of building mounted luminaires. Existing luminaires do not have full cutoff distribution that does not meet present dark sky requirements. Existing luminaires consist of incandescent and/or metal halide lamp sources. It was noted that the adjacent parking lot is a municipal lot, there is no lighting in the parking area.

E. Fire Alarm System:

1. The fire alarm head end was replaced within the last six months. The replacement of existing audio/visual devices and manual pull stations is partially completed. Many locations still have old audio/visual units and manual pull stations. Locations of manual pull stations are lacking at some egress doors and are not within code at other locations. Audio/visual coverage is lacking in several areas.

F. Receptacles and General Power:

1. Duplex receptacle quantities are lacking throughout the building.

G. Clock/Program System:

1. A clock/program system was installed throughout the existing building and addition in 1973. It was reported that these systems are no longer functional.

H. Security/Access Control:

1. There are various access control systems on exterior doors and select interior doors per the various independent tenants in the building.

I. IT/Telecommunications:

1. In general the building has telephones throughout, located in the majority of classrooms and office spaces.

2. There is no IT to any of the classrooms. There is IT to the Media Center, offices, and other selected areas.

J. Recommendations:

1. Service and Distribution

a. Based on existing loads and proposed renovations the recommendation is to maintain the existing primary service, pad mounted transformer, and 2,000A, 208/120V secondary service.

b. Existing 2,000A switchboard may be maintained and reused pending complete testing of the entire switchboard. Existing feeder breakers serving existing panelboards and mechanical equipment may be reused

where applicable, otherwise new feeder breakers will be required to serve new panelboards, mechanical equipment, and kitchen equipment. Presently there are three 600AF/500AT breakers serving existing rooftop equipment, based on the proposed HVAC upgrades and air conditioning alternate scenarios the existing circuit breakers and distribution system will require replacement and upgrades to suit the quantity and size of the new HVAC equipment.

c. Existing panelboards determined to be reusable may be maintained. Whereas many panelboards are located in various spaces throughout the buildings and not in electric closets and circuit breaker requirements will be changing based on proposed renovations, the majority of the existing panelboards and associated feeders will require removal and replacement. New panelboards and feeders are recommended throughout the entire building; where possible it is recommended to locate panelboards within centrally located electric closets. A new panelboard should be located within new kitchen area.

d. New breakers in the switchboard, feeders, and distribution equipment will be required for all new mechanical equipment.

e. The existing main electric room has evidence of moisture/water damage. This room should be completely cleaned and any moisture/water infiltration issues resolved.

2. Emergency Power System

a. A new gas-fired emergency generator is recommended. At a minimum the new unit should be the same size as the existing unit, 45kW. Any additional loads beyond emergency lighting and boilers would trigger an increase in the generator size, this would more than likely require the generator to be relocated as the existing Generator Room is very tight.

b. New transfer switches are recommended, one for life safety and one for standby loads. To comply with current code, the life safety equipment (automatic transfer switch and distribution panel) will require a two-hour rated electric closet. Remote life safety panelboard locations will require two-hour rated feeders and two-hour rated closets to house panelboards.

c. New generator will provide backup power for life safety lighting, boilers, associated controls, and circulator pumps.

3. Lighting

a. Luminaires will be primarily LED type.

b. Classroom luminaires will be pendant linear direct/indirect.

c. Illuminated LED type exit signs will be wired to emergency generator and located in all paths of egress and places of assembly.

d. Selected luminaires in corridors, interior rooms, stairs, and places of assembly will be wired to emergency generator to provide minimum code required light levels.

e. Outdoor lighting will be building mounted, full cutoff luminaires controlled by photocell and time switch.

f. Luminaires throughout the building will be suitable for specific space usage in both esthetics and efficiency.

4. Lighting Controls

a. A low voltage lighting control system will be provided for common areas such as corridors and other areas not controlled by occupancy sensors.

b. Vacancy/occupancy sensors will control lighting in most spaces including classrooms, offices, and utility type spaces.

c. Daylight harvesting will be employed in all perimeter classrooms, offices, and other spaces with substantial daylight with daylight sensors in each space.

5. Convenience Power

a. Duplex receptacles will be provided throughout the building in quantities to suit space programming.

b. Duplex receptacles for cleaning will be provided in corridors and in other large spaces at maximum of 50 feet on center.

6. Fire Alarm

a. To supplement the new equipment recently installed, the following will be provided:

1) Manual pull stations (with tamperproof covers), at points of egress, and other locations as required to meet code.

2) Audible/visual units in corridors, classrooms, and throughout the building to meet code.

3) Visual only units in conference rooms, meeting rooms and small toilets.

4) Smoke detectors in corridors, stairwells, electric, and telecommunications rooms, elevator lobbies, and elevator machine rooms for elevator recall.

5) Smoke duct detectors in HVAC units over 2,000 CFM, and within 5 feet of smoke dampers.

6) Connections to sprinkler water flow and valve supervisory switches.

7) Connections to kitchen hood.

8) Remote annunciator at front entrance (if required by local fire department).

9) 60 hour battery back-up.

10) 24 VDC magnetic hold open devices at smoke doors.

11) 25 percent spare capacity in FACP for notification appliance circuits (NAC's).

12) Wiring will be run in conduit and/or MC cable.

7. Technology, provide complete installation and testing per technology documents.

   a. Tel/data/video system throughout the building.

   b. Local sound systems, including communications between designated entries and administrative office.

   c. Clock system (if applicable).

   d. Program and paging/intercom system.

   e. Cable TV system.

   f. Head-end room layouts, power, and HVAC conditioning requirements.

   g. Local UPS.

8. Intrusion/Access Control Alarm

   a. Recommend a new intrusion alarm/access control system. System will provide magnetic switches on perimeter doors, motion sensors in all perimeter rooms on first floor and upper level corridors. System will have secure-access zoning, and automatic two channel dialer to notify police and/or private monitoring company.

   b. CCTV coverage will be provided at Main Entry Vestibule to Main Lobby, corridors, secondary entries and around the exterior perimeter of the building. System will be web based monitored at Administration Suite.

Appendix D

Renovation Study –
Structural Narrative

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GIBBS SCHOOL BUILDING
Arlington, Massachusetts

Renovation Study – Structural Narrative
April 7, 2016

INTRODUCTION

Foley Buhl Roberts & Associates, Inc. (FBRA) is collaborating with *HMFH Architects, Inc. (HMFH)* and their consultants in the review and evaluation of structural issues/conditions at the former Gibbs Junior High School in Arlington, MA and the study of potential renovations to the facility. The purpose of this report is to identify and describe the various structural systems and to comment on the structural issues/conditions observed. Comments relating to proposed renovations/alterations are presented as well. .

The Gibbs School building is located at 41 Foster Street in East Arlington. The Town of Arlington shuttered the school in 1989; presently, the building is occupied by The Arlington Center for the Arts (ACA), the Arlington Recreational Department, the Kelliher Center, Learn to Grow Day Care and the Lesley Ellis School. The Arlington School Department is studying the potential return of the building to educational use, to help accommodate potential future enrollment increases in the Arlington Public Schools system.

The original three-story, building was constructed as a Junior High School in 1928, on a relatively level site. The site is bordered by Foster Street on the north side and by Tufts Street to the south. The building is “tee” shaped in plan, with a three-story Classroom Wing “stem” extending westward from the original Gymnasium/Auditorium (East) Wing. A two-story addition was constructed on the north side of the original Classroom Wing in 1973. The 1928 building was renovated in 1973 as well; a Mezzanine level was constructed in the original Auditorium and the space was converted to a Library/Media Center. A small addition at the south end of the original Gymnasium was also constructed in 1973. A new, three-stop elevator was installed in the Classroom Wing.

Program elements at the First (Ground) Floor of the original building included Locker Rooms (below the Gymnasium), the (depressed) Boiler Room, Shops and Classrooms. The (two-story) Gymnasium and the Library/Media Center (former Auditorium) spaces are located at the Second Floor of the East Wing. Classrooms are located along the north and south sides of a central, east-west corridor at the Second and Third Floors of the Classroom Wing. The original (underground) Coal Storage Room was constructed along the south wall of the Boiler Room, adjacent to the Gymnasium. The roof of this room is presently an outdoor paved play area.

Program elements at the First (Ground) Floor of the 1973 addition included a Kitchen and Cafetorium, a Music Room, Teacher Dining, Toilet Rooms and various storage spaces. An Art Room and the Administrative Offices were located at the Second Floor level.

The roof of the original building was reportedly replaced 5 to 6 years ago. The roof of the 1973 addition appears to be original.

With the exception of the two-story Entry Lobby of the 1973 addition, neither the original building nor the addition are sprinklered.

Renovations to the original building and the 1973 addition have occurred since the school was shuttered in 1989; non-load bearing partitions were added, removed and altered to accommodate the present (multiple) tenants using the facility.

Structural conditions at the Gibbs School Building were reviewed at the site by FBRA on March 24, 2016. Our observations of the existing floor and roof structure were limited, as most areas were obscured by finishes.

The following original construction documents were reviewed in the preparation of this Structural Narrative:

Junior High School East Arlington Mass: Architectural and Structural Drawings 1 through 13, prepared by Frank Irving Cooper Corporation Architects - Boston, Massachusetts, dated July 15, 1927 (original building).

Junior High School East – Alterations and Additions: Structural Drawings S-1 through S-4 and Architectural Drawings A-1 through A-4, prepared by Drummey Rosane Anderson – Wellesley, Massachusetts, dated March 7, 1973 (addition).

Gibbs School: Architectural Existing Conditions Plans (Ground, First and Second Floors), prepared by Nashawtuc Architects, Inc. Concord, Massachusetts, dated June 20, 2002.

No exploratory building demolition or structural materials testing was performed in conjunction with this Study**.** No subsurface soils information or geotechnical studies/reports were available. .

I. STRUCTURAL SYSTEMS DESCRIPTION

The original (1928) Gibbs School Building is a steel framed structure with a concrete slab on grade First (Ground) Floor and a conventional spread footing foundation. Exterior walls are unreinforced, load bearing masonry construction. The 1973 addition is also steel framed, with a concrete slab on grade First Floor and a spread footing foundation. Exterior walls are non-load bearing masonry (veneer) construction.

Structural spans from the exterior masonry bearing walls to the 14'-2"+/- wide central corridor in the 1928 Classroom Wing are 23'-6"+/-. The clear span of the roof over the (East) Gymnasium/Auditorium Wing of the original building is approximately 71 feet. Structural spans in the 1973 addition vary.

Structural Materials: Material strengths are listed on the 1973 Structural Drawings; however, this information was not included in the 1928 building documents:

Original Building (Assumed):

Concrete:	2,500 psi compressive strength
Steel Reinforcing:	18,000 psi allowable tension stress
Structural Steel:	18,000 psi allowable tension stress

Addition:

Concrete:	3,000 psi compressive strength
Steel Reinforcing (deformed bars):	Intermediate grade; Fy= 40 ksi (assumed)
Structural Steel:	ASTM A 36; Fy= 36 ksi

Design Live Loads: Design live loads are noted on the original construction drawings as follows:

Original Building (Not Noted)

Addition:

Roof:	40 psf
Floors:	100 psf
Corridors:	100 psf

The design floor live loads listed on the Structural Drawings for the addition meet the minimum requirements of the current code. The design roof snow load for the addition is 40 psf, which exceeds the current, flat roof snow load requirement (except at drift areas) for a school building in the Town of Arlington.

Confirmation or determination of the structural design for the original building and the addition is beyond the scope of this Study. Note that buildings constructed during the 1920's were typically not designed for lateral (wind and seismic) loading. The 1973 addition; however, was likely designed under the Massachusetts Building Regulations for Schoolhouses, which required consideration of wind loads (20 psf).

Story Heights: The Second Floor of the 1928 Classroom Wing and the 1973 addition is 11'-6" above the First Floor. The Third Floor of the 1928 Classroom Wing is 13'-6" above the Second Floor.

Expansion Joints: There are no internal expansion joints in the original building. The 1973 Architectural Drawings note an expansion joint between the addition and the 1928 Classroom Wing; however, it does not appear that this was properly addressed on the Structural Drawings.

Roof Construction: Flat roof construction at the 1928 Classroom Wing consists of a 2" thick, stone concrete slab on 3/8" metal ribbed lath, spanning to open web steel bar joists (8" to 12" deep; spaced at 22" o.c.). Steel joists are supported by (unreinforced) masonry bearing walls at the building perimeter and by steel beams spanning to 6" or 8" deep, wide flange steel columns along each side of the central corridor. Sloped roof construction at the 1928 Gymnasium/Auditorium Wing is similar, with open web steel bar joists spanning in the north-south direction to clear spanning steel trusses (sloped top chord; flat bottom chord). Trusses are supported by (unreinforced) masonry bearing walls at the Gymnasium and by 8" deep, wide flange steel columns in the exterior walls at the (original) Auditorium.

Sloped roof construction at the 1973 addition consists 1½" deep, 22 gauge steel roof deck spanning 4+/- feet to open web steel bar joists. Steel joists are supported by steel beams and steel columns (HSS/Tube shape). The roof of the Cafetorium is framed with 3" (nominal) timber deck spanning 11+/- feet to 8" deep wide flange steel beams. Steel beams are supported by sloping, tubular steel trusses, which clear span the space.

Second and Third Floor Construction: Typical floor construction at the Second and Third Floors of the 1928 Classroom Wing consists of a 4" thick, stone concrete slab on 3/8" metal ribbed lath, spanning to open web steel bar joists (10" to 12" deep; spaced at 20" o.c.). Steel joists are supported by (unreinforced) masonry bearing walls at the building perimeter and by steel beams spanning to 6" or 8" wide flange steel columns along each side of the central

corridor. Gymnasium Floor construction is similar, with steel joists (10" deep) and steel beams (12" deep) supported by wide flange steel columns, arranged on a rectangular grid (12'-10"x16'-3" typical structural bay).

The Second Floor of the 1973 addition consists of a 3½" deep concrete slab on steel forms, supported by open web steel bar joists (12" to 14" deep) spaced at 2'-0" o.c. Steel joists span to wide flange steel beams, which are supported by HSS/Tube steel columns.

First Floor Construction: First Floor construction in the 1928 building is a 4" thick concrete slab on grade (6" thick at the Boiler Room). First floor construction in the 1973 addition is a 5" thick concrete slab on grade, reinforced with welded wire fabric. The floor of the 1973 Cafetorium is stepped (three levels); the stage appears to be wood framed construction.

Exterior Wall Construction at the original building is typically a 12" thick, unreinforced load bearing masonry barrier wall (including a 4" face brick). Accent elements (cornice, water table course, etc.) appear to be precast concrete (cast stone). Exterior wall construction at the 1973 addition appears to be a 4" brick veneer, with a 2" cavity and an 8" CMU backup (non-load bearing).

Interior Partitions in both the 1928 building and the 1973 addition are typically stud construction except at certain locations (e.g. Locker Rooms below the 1928 Gymnasium and the south Kitchen wall of the 1973 addition).

Subsurface Soils/Foundations: No subsurface soils information was available; however, both the original 1928 building and the 1973 addition are supported on a conventional spread footing foundation. Columns are supported on individual spread footings and perimeter foundation walls are supported on continuous strip footings.

Drainage: It does not appear that perimeter foundation drains or underslab drains are present at the original 1928 building or the 1973 addition. The exterior finish grade is typically about 2 feet higher than the First (Ground) Floor level.

Fire Resistance*:* The unprotected, steel framed floor and roof construction in the 1928 building and the 1973 addition has no fire rating; except ceilings in the 1928 building may provide a limited level of protection. As previously noted, most areas of the 1928 building and the 1973 addition are not sprinklered.

Lateral Load Resistance: The 1928 building was designed and constructed prior to the introduction of seismic codes. Wind loads were often not considered in the design of low-rise buildings constructed in this era. Accordingly, there is no defined lateral load resisting system. Interior and perimeter masonry walls (unreinforced) provide lateral force resistance; however, the construction of these walls does not meet current Code requirements. The 1973 addition; however, was presumably designed under the Massachusetts Building Regulations for Schoolhouses, which required consideration of wind loads (20 psf). Lateral force resistance for this building is likely achieved by the unreinforced exterior masonry walls and the frame action of the reinforced concrete slabs, beams, joists and columns; it does not appear that steel bracing or rigid steel frames were provided.

II. STRUCTURAL CONDITION/COMMENTS

Structural Conditions at the Gibbs School Building were reviewed at the site (to the extent possible) on March 24, 2016. Generally speaking, floor and roof construction at the 1928 building and the 1973 addition appears to be in satisfactory condition; there is no evidence of structural distress that would indicate significantly overstressed, deteriorated or failed structural members.

Foundations appear to be performing adequately; there are no signs of significant, total or differential settlements.

Floors and roofs appear to have been constructed in general accordance with the original Structural Drawings.

Structural/structurally related conditions observed during our site visit are summarized below:

1. Repointing of the brick veneer is required at certain locations. Brick has cracked, and mortar joints of cast stone elements are open in a number of locations.

2. Masonry site walls at the 1973 entry terrace have deteriorated and are in need of repair.

3. Steel loose lintel angles over doors and windows in the 1928 building are rusting in a number of locations. Rust jacking of the brick has occurred; potentially fracturing header courses. These angles should be removed and replaced with properly flashed, hot-dipped galvanized steel lintel angles.

4. Vertical cracks and localized chips in the concrete foundation walls were observed in a number of locations; particularly at the exposed perimeter foundation walls of the 1928 Gymnasium/Auditorium Wing. The cracks appear to be shrinkage related and are not structural or the result of foundation settlements.

5. Concrete wall reinforcing over window openings (particularly along the east wall of the 1928 Gymnasium/Auditorium Wing) has corroded and has spalled the concrete (4 to 5 locations).

6. Horizontal cold joints were observed in the exposed concrete foundation walls of the 1973 addition on the south side of the 1928 Gymnasium. These joints are related to improper consolidation of the concrete during placement and are not a structural concern.

7. The front entry steps to the original Auditorium are in poor condition. The center section of these stairs has been addressed by placing new concrete risers and treads over the original construction. Elsewhere around the building, exterior stairs have been repaired or replaced.

8. The roof of the 1973 addition is apparently original and is beyond the warranty period. This roof reportedly leaks; replacement is recommended, in conjunction with a future renovation of the building.

9. The condition of the masonry chimney (boiler flue) was not determined. An investigation of the chimney by a qualified inspector is recommended, in conjunction with a future renovation of the building. .

10. Curtainwall construction at the two-story lobby area reportedly leaks (particularly at the base) and does not meet current performance standards. Replacement of this construction is recommended, in conjunction with a future renovation of the building.

11. Moisture damage was observed on the interior surface of the exterior south wall of the 1928 Classroom Wing. The conditions observed may be related to moisture issues within the wall, or previous roofing/flashing problems at the edge of the building. Efflorescence in the face brick or brick veneer was observed in several locations. Further review is recommended.

12. During periods of heavy rainfall, flooding was reportedly occurring at the exterior stairwells leading to the First Floor Locker Rooms on the east and west sides of the 1928 Gymnasium. Flooding also occurs on the east and west sides of the 1973 section connecting to the 1928 Classroom Wing (Entry Lobby and Service Corridor areas). Exterior grades surrounding the Gymnasium stairs have been recently modified (a step was added) and maintenance personnel have been keeping drains clear; FBRA understands that the problem has not reoccurred.

13. There are accessibility issue in certain areas; further review is recommended. The ramp at the east end of the First Floor corridor leading to the Gymnasium/Auditorium Wing appears to be relatively steep (perhaps greater than 1:12).

14. The egress stairs on the east and west sides of the Gymnasium (at the south end) are non-code compliant.

15. The roof of the former Coal Storage Room to the south of the Boiler Room is in poor condition and should be addressed immediately. We recommend that the structure be temporarily shored and subsequently repaired/reconstructed in conjunction with a future renovation of the building.

III. RENOVATIONS AND ADDITIONS – MEBC REQUIREMENTS

General comments relating to potential renovations, alterations and additions to the Gibbs School Building are presented in this section. Renovations, alterations, repairs and additions to existing buildings in Massachusetts are governed by the provisions of the Massachusetts State Building Code (MSBC – 8th Edition) and the Massachusetts Existing Building Code (MEBC). These documents are based on amended versions of the 2009 *International Building Code (IBC)* and the 2009 *International Existing Building Code (IEBC)*, respectively.

The MEBC defines three (3) compliance methods for the repair, alteration, change of occupancy, addition or relocation of an existing building. The method of compliance is chosen by the Design Team (based on the project scope and cost considerations) and cannot be combined with other methods.

The *Prescriptive Compliance Method* (IEBC Chapter 3) duplicates Sections 3403 through 3411 of Chapter 34 in the IBC and prescribes specific minimum requirements for construction related to additions, alterations, repairs, fire escapes, glass replacement, change of occupancy, historic buildings, moved buildings and accessibility. A complete structural evaluation of the building is required by the Massachusetts Amendments. If the impact of the proposed alterations and

additions to structural elements carrying gravity loads and lateral loads is minimal (less than 5% and 10% respectively), seismic upgrades to an existing building are generally not required.

The *Work Area Compliance Method* (IEBC Chapters 4 through 12) is based on a proportional approach to compliance, where upgrades to an existing building are triggered by the type and extent of work. The Work Area Compliance Method includes requirements for three levels of alterations, in addition to requirements for repairs, changes in occupancy, additions, historic buildings or moved buildings. A complete seismic evaluation of the existing building is required under the following conditions: Level 2 alterations where the demand to capacity ratio of lateral load resisting elements has been increased by more than 10%, all Level 3 alterations, a change in occupancy to a higher category and where structurally attached additions (vertical or horizontal) are planned (not applicable to this project).

The *Performance Compliance Method* (IEBC Chapter13) duplicates Section 3412 of Chapter 34 in the IBC and provides for evaluating a building based on fire safety, means of egress and general safety (19 parameters total). This method allows for the evaluation of the existing building to demonstrate that proposed alterations, while not meeting new construction requirements, will maintain existing conditions to at their current levels (at a minimum) or improve conditions, as required. A structural investigation and analysis of the existing building is required to determine the adequacy of the structural systems for the proposed alteration, addition or change of occupancy. A report of the investigation and evaluation, along with proposed compliance alternatives must be submitted to the code official for approval.

The *Work Area Compliance Method* will likely be the most appropriate method of compliance for this building. Based on the scope of the proposed renovations, it appears that the project would be classified as a *Level 2 Alteration*. This conclusion is based on the assumption that the *Work Area* (i.e. reconfigured spaces) will be less than 50% of the gross building area. There will be no change in use. At the First and Third Floors of the 1928 Classroom Wing, it is proposed to add lightweight stud walls along each side of the central corridor, restoring the original condition.

Additions – General Comments - MEBC

The design and construction of any addition to either the 1928 building or the 1973 addition (no additions are proposed) would be conducted in accordance with the Code for new construction. Additions should be structurally separated from the existing, adjacent construction by an expansion (seismic) joint to avoid an increase in gravity loads or lateral loads to existing structural elements.

Renovations/Alterations – General Comments - MEBC

Where proposed alterations to existing structural elements carrying gravity loads result in a stress increase of over 5%, the affected element will need to be reinforced or replaced to comply with the Code for new construction. Proposed alterations to existing structural elements carrying lateral load (i.e. masonry walls) which result in an increase in the demand - capacity ratio of over 10% should be avoided, if possible. Essentially, this means that removal of, or major alterations to the existing, exterior unreinforced masonry bearing walls in the original 1928 building should be minimized (no significant alterations proposed).

IV. PROPOSED RENOVATIONS – ANTICIPATED SCOPE OF STRUCTURAL WORK

Proposed renovations to the Gibbs School Building will not add significant mass; in addition, no major modifications to existing masonry walls (providing lateral stability) in the 1928 building are planned. Accordingly, the anticipated scope of structural/structurally related work would likely be required:

1. Repair/repoint 1928 face brick and precast accent elements, as previously noted.

2. Repair masonry site walls at the 1973 entry plaza, as previously noted.

3. Replace existing, corroded steel loose lintels with galvanized steel loose lintels, or clean and coat existing steel loose lintels if sufficient sectional area remains. Repair adjacent masonry and provide new flashing as required. For budgeting purposes, assume that 20% of the lintels in the 1928 Classroom wing will need replacement and 20% will need to be cleaned and coated. It appears that some windows may have been replaced in the past; provide new replacement windows as recommended by the Architect.

4. Repair areas of corroded reinforcing and spalled concrete over window openings at the east foundation wall of the Gymnasium/Auditorium Wing.

5. Conduct additional repairs at exterior concrete stairs; particularly at the former Auditorium entrance on the north side of the 1928 building. Review the structural adequacy and condition of exterior stair railings; reinforce/replace as required.

6. Replace the roof of the 1973 addition, as previously noted.

7. Inspect and evaluate the existing masonry chimney (boiler flue); repair/reinforce, brace or lower as may be required.

8. Replace the 1973 Entry Lobby curtainwall construction, as previously noted.

9. Review/evaluate apparent moisture issues in the 1928 building south wall; repair/address as appropriate.

10. Review and address surface and foundation drainage issues at the 1973 service area, as previously noted. Continue to maintain drains at the landings of the exterior Gymnasium stairwells.

11. Address accessibility issues, as recommended by the Architect.

12. Repair/reconstruct the deteriorated roof of the Coal Storage Room, as previously noted. Alternately, this construction could be removed and the area properly backfilled.

13. FBRA understands that the egress stairs on the east and west sides of the Gymnasium (at the south end) are non-code compliant; modify or replace at least one of the stairs, as recommended by the Architect

14. Anchor the top of all interior masonry partitions scheduled to remain to the underside of the floor or roof structure above. Note that most of the interior partitions in the1928 building and in the 1973 addition are stud wall construction; masonry partitions in the First Floor Locker Rooms below the Gymnasium and the south wall of the 1978 Kitchen are scheduled to be removed. Accordingly, the scope of this work is expected to be limited.

15. Provide a new main entry/canopy on the south (Tufts Street) side of the 1928 Classroom Wing. Refer to Architectural documents for additional information.

16. Provide miscellaneous structural supports and/or reinforcing to support new MEP equipment.

17. Provide new floor and roof openings as required to accommodate new MEP/FP work.

18. Provide racks, hangers, etc. for new plumbing and fire protection work, as recommended by the Architect and MEP/FP Engineers.

19. Review and evaluate the existing Construction Type (Type IIB; Non Combustible, Unprotected) and required fire resistance ratings; locally protect structural elements supporting rated enclosures, as may be required.

End of Structural Narrative

Appendix E

Report for Hazardous Material Determination Survey

REPORT
FOR
HAZARDOUS MATERIALS DETERMINATION
SURVEY
AT THE
GIBBS SCHOOL
ARLINGTON, MASSACHUSETTS

PROJECT NO: 216 124.00

Survey Dates:
March 24 & 28, 2016

SURVEY CONDUCTED BY:

UNIVERSAL ENVIRONMENTAL CONSULTANTS
12 BREWSTER ROAD
FRAMINGHAM, MA 01702

UEC universal environmental consultants

March 31, 2016

Ms. Lori Cowles
HMFH Architects
130 Bishop Allen Drive
Cambridge, MA 02139

Reference: Hazardous Materials Determination Survey
Gibbs School, Arlington, MA

Dear Ms. Cowles:

Thank you for the opportunity for Universal Environmental Consultants (UEC) to provide professional services.

Enclosed please find the report for hazardous materials determination survey at the Gibbs School, Arlington, MA.

Please do not hesitate to call should you have any questions.

Very truly yours,

Universal Environmental Consultants

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Ammar M. Dieb
President

UEC:\216 124\REPORT.DOC

Enclosure

1.0 INTRODUCTION:

UEC has been providing comprehensive asbestos services since 2001 and has completed projects throughout New England. We have completed projects for a variety of clients including commercial, industrial, municipal, and public and private schools. We maintain appropriate asbestos licenses and staff with a minimum of twenty years of experience.

As part of the proposed renovation project, UEC was contracted by HMFH Architects to conduct the following services at the Gibbs School, Arlington MA:

- Inspection and Testing for Asbestos Containing Materials (ACM);
- Inspection for Polychlorinated Biphenyls (PCB's)-Electrical Equipment and Light Fixtures;
- Inspection for Lead Based Paint (LBP);
- Inspection for Oil Tanks.

The scope of work included the inspection of accessible ACM, collection of bulk samples from materials suspected to contain asbestos, determination of types of ACM found and cost estimates for remediation. Bulk samples analyses for asbestos were performed using the standard Polarized Light Microscopy (PLM) in accordance with EPA standard. Bulk samples were collected by a Massachusetts licensed asbestos inspector Mr. Leonard J. Busa (AI-030673) and analyzed by a Massachusetts licensed laboratory Asbestos Identification Laboratory, Woburn, MA.

This survey should not be used to demolish the building. A comprehensive survey will be required by to any renovation or demolition project that includes destructive testing.

Refer to samples results.

2.0 FINDINGS:

Asbestos Containing Materials (ACM):

The regulations for asbestos inspection are based on representative sampling. It would be impractical and costly to sample all materials in all areas. Therefore, representative samples of each homogenous area were collected and analyzed or assumed.

All suspect materials were grouped into homogenous areas. By definition a homogenous area is one in which the materials are evenly mixed and similar in appearance and texture throughout. A homogeneous area shall be determined to contain asbestos based on findings that the results of at least one sample collected from that area shows that asbestos is present in an amount greater than 1 percent in accordance with EPA regulations.

All suspect materials that contain any amount of asbestos must be considered asbestos if it is scheduled to be removed per the Department of Environmental Protection (DEP) regulations.

Number of Samples Collected

Seventy eight (78) bulk samples were collected from the following materials suspected of containing asbestos:

Type and Location of Material

1. Wall plaster at second floor
2. Wall plaster at classroom 1
3. Wall plaster at main corridor janitor closet

4. Ceiling plaster at classroom 3
5. Ceiling plaster at main corridor by grade 1/2
6. Ceiling plaster at boiler room
7. Ceiling plaster at basement
8. Glue daub for 1’ x 1’ acoustical tile above ceiling tile at basement
9. Glue daub for 1’ x 1’ acoustical tile above ceiling tile at basement
10. 2’ x 4’ Suspended acoustical ceiling tile at basement by music A
11. 2’ x 4’ Suspended acoustical ceiling tile at basement
12. 2’ x 4’ Suspended acoustical ceiling tile at basement hallway
13. 1’ x 1’ Acoustical ceiling tile at toddler 2
14. 1’ x 1’ Acoustical ceiling tile at classroom 3
15. 1’ x 1’ Acoustical ceiling tile at hallway to theater
16. 1’ x 1’ Acoustical ceiling tile at first floor main corridor
17. 1’ x 1’ Acoustical ceiling tile at basement break room
18. Rough ceiling plaster at basement studio J
19. Rough ceiling plaster at basement studio J
20. Rough ceiling plaster at basement room
21. Rough ceiling plaster at basement room
22. Rough ceiling plaster at basement room
23. Joint compound at second floor clay room
24. Joint compound at first floor
25. Insulation inside wood fire door at top of stairs
26. Insulation inside wood fire door at classroom 2
27. Insulation inside wood fire door at entrance to studio J
28. Insulation inside wood fire door at theater costume room
29. Debris at crawl space above second floor ceiling plaster
30. Roofing debris at crawl space above second floor ceiling plaster
31. Roofing debris at crawl space above second floor ceiling plaster
32. Hard joint insulation at studio J
33. Hard joint insulation at boiler room
34. Hard joint insulation at boiler room
35. Pipe insulation at boiler room
36. Boiler insulation at boiler room
37. Boiler insulation at boiler room
38. Boiler insulation at boiler room
39. Black paint on boiler at boiler room
40. Black paint on boiler at boiler room
41. Hard brown lab table at first floor group room
42. Hard brown lab table at classroom 1
43. Brown sink coating at clay room
44. Vertical caulking in brick at 1973 wing
45. Vertical caulking in brick at 1973 wing
46. Brown/white 12” x 12” vinyl floor tile at 1973 wing basement
47. Mastic for brown/white 12” x 12” vinyl floor tile at 1973 wing basement
48. Brown/white 12” x 12” vinyl floor tile at 1973 wing basement
49. Mastic for brown/white 12” x 12” vinyl floor tile at 1973 wing basement
50. Brown/white 12” x 12” vinyl floor tile under carpet at basement hallway
51. Mastic for brown/white 12” x 12” vinyl floor tile under carpet at basement hallway
52. Leveler for brown/white 12” x 12” vinyl floor tile under carpet at basement hallway
53. Carpet glue at basement hallway
54. Mastic for brown/white 12” x 12” vinyl floor tile under carpet at basement hallway
55. Carpet glue at basement hallway
56. Second layer flooring under new blue vinyl floor tile at basement room
57. Second layer flooring under new blue vinyl floor tile at classroom 1
58. Mastic for second layer flooring under new blue vinyl floor tile at classroom 1

59. Old vinyl floor tile under carpet at toddler 2
60. Mastic for old vinyl floor tile under carpet at toddler 2
61. Old vinyl floor tile under carpet at second floor hallway
62. Mastic for old vinyl floor tile under carpet at second floor hallway
63. Brown/white 12” x 12” vinyl floor tile on top of old floor tile at clay room
64. Old linoleum floor covering under carpet at second floor hallway
65. Red 12” x 12” at theater
66. Leopard 12” x 12” at transitional kindergarten
67. Mastic for leopard 12” x 12” at transitional kindergarten
68. Exterior window framing caulking
69. Exterior window framing caulking
70. Exterior window framing caulking
71. Exterior grey caulking in stone sill
72. Exterior grey caulking in stone sill
73. Exterior old door framing caulking
74. Exterior old door framing caulking
75. Glue on Styrofoam panel behind brick by theater entrance
76. Brown/white 12” x 12” vinyl floor tile under carpet at basement hallway
77. Mastic for brown/white 12” x 12” vinyl floor tile under carpet at basement hallway
78. Interior window glazing caulking at second floor main corridor

Samples Results

Type and Location of Material	**Sample Result**
1. Wall plaster at second floor	No Asbestos Detected
2. Wall plaster at classroom 1	No Asbestos Detected
3. Wall plaster at main corridor janitor closet	No Asbestos Detected
4. Ceiling plaster at classroom 3	No Asbestos Detected
5. Ceiling plaster at main corridor by grade 1/2	No Asbestos Detected
6. Ceiling plaster at boiler room	No Asbestos Detected
7. Ceiling plaster at basement	No Asbestos Detected
8. Glue daub for 1’ x 1’ acoustical tile above ceiling tile at basement	No Asbestos Detected
9. Glue daub for 1’ x 1’ acoustical tile above ceiling tile at basement	No Asbestos Detected
10. 2’ x 4’ Suspended acoustical ceiling tile at basement by music A	No Asbestos Detected
11. 2’ x 4’ Suspended acoustical ceiling tile at basement	No Asbestos Detected
12. 2’ x 4’ Suspended acoustical ceiling tile at basement hallway	No Asbestos Detected
13. 1’ x 1’ Acoustical ceiling tile at toddler 2	No Asbestos Detected
14. 1’ x 1’ Acoustical ceiling tile at classroom 3	No Asbestos Detected
15. 1’ x 1’ Acoustical ceiling tile at hallway to theater	No Asbestos Detected
16. 1’ x 1’ Acoustical ceiling tile at first floor main corridor	No Asbestos Detected
17. 1’ x 1’ Acoustical ceiling tile at basement break room	No Asbestos Detected
18. Rough ceiling plaster at basement studio J	No Asbestos Detected
19. Rough ceiling plaster at basement studio J	No Asbestos Detected
20. Rough ceiling plaster at basement room	No Asbestos Detected
21. Rough ceiling plaster at basement room	No Asbestos Detected
22. Rough ceiling plaster at basement room	No Asbestos Detected
23. Joint compound at second floor clay room	No Asbestos Detected
24. Joint compound at first floor	No Asbestos Detected
25. Insulation inside wood fire door at top of stairs	25% Asbestos
26. Insulation inside wood fire door at classroom 2	27% Asbestos
27. Insulation inside wood fire door at entrance to studio J	20% Asbestos
28. Insulation inside wood fire door at theater costume room	12% Asbestos
29. Debris at crawl space above second floor ceiling plaster	50% Asbestos
30. Roofing debris at crawl space above second floor ceiling plaster	No Asbestos Detected

31.	Roofing debris at crawl space above second floor ceiling plaster	No Asbestos Detected
32.	Hard joint insulation at studio J	No Asbestos Detected
33.	Hard joint insulation at boiler room	No Asbestos Detected
34.	Hard joint insulation at boiler room	No Asbestos Detected
35.	Pipe insulation at boiler room	50% Asbestos
36.	Boiler insulation at boiler room	No Asbestos Detected
37.	Boiler insulation at boiler room	No Asbestos Detected
38.	Boiler insulation at boiler room	40% Asbestos
39.	Black paint on boiler at boiler room	No Asbestos Detected
40.	Black paint on boiler at boiler room	No Asbestos Detected
41.	Hard brown lab table at first floor group room	No Asbestos Detected
42.	Hard brown lab table at classroom 1	No Asbestos Detected
43.	Brown sink coating at clay room	<1% Asbestos
44.	Vertical caulking in brick at 1973 wing	No Asbestos Detected
45.	Vertical caulking in brick at 1973 wing	No Asbestos Detected
46.	Brown/white 12” x 12” vinyl floor tile at 1973 wing basement	No Asbestos Detected
47.	Mastic for brown/white 12” x 12” vinyl floor tile at 1973 wing basement	2% Asbestos
48.	Brown/white 12” x 12” vinyl floor tile at 1973 wing basement	2% Asbestos
49.	Mastic for brown/white 12” x 12” vinyl floor tile at 1973 wing basement	No Asbestos Detected
50.	Brown/white 12” x 12” vinyl floor tile under carpet at basement hallway	2% Asbestos
51.	Mastic for brown/white 12” x 12” floor tile under carpet at basement hallway	7% Asbestos
52.	Leveler for brown/white 12” x 12” floor tile under carpet at basement hallway	No Asbestos Detected
53.	Carpet glue at basement hallway	No Asbestos Detected
54.	Mastic for brown/white 12” x 12” floor tile under carpet at basement hallway	7% Asbestos
55.	Carpet glue at basement hallway	No Asbestos Detected
56.	Second layer flooring under new blue vinyl floor tile at basement room	No Asbestos Detected
57.	Second layer flooring under new blue vinyl floor tile at classroom 1	3% Asbestos
58.	Mastic for second layer flooring under new blue vinyl floor tile at classroom 1	10% Asbestos
59.	Old vinyl floor tile under carpet at toddler 2	3% Asbestos
60.	Mastic for old vinyl floor tile under carpet at toddler 2	10% Asbestos
61.	Old vinyl floor tile under carpet at second floor hallway	5% Asbestos
62.	Mastic for old vinyl floor tile under carpet at second floor hallway	10% Asbestos
63.	Brown/white 12” x 12” vinyl floor tile on top of old floor tile at clay room	2% Asbestos
64.	Old linoleum floor covering under carpet at second floor hallway	No Asbestos Detected
65.	Red 12” x 12” at theater	No Asbestos Detected
66.	Leopard 12” x 12” at transitional kindergarten	No Asbestos Detected
67.	Mastic for leopard 12” x 12” at transitional kindergarten	No Asbestos Detected
68.	Exterior window framing caulking	No Asbestos Detected
69.	Exterior window framing caulking	No Asbestos Detected
70.	Exterior window framing caulking	No Asbestos Detected
71.	Exterior grey caulking in stone sill	5% Asbestos
72.	Exterior grey caulking in stone sill	5% Asbestos
73.	Exterior old door framing caulking	No Asbestos Detected
74.	Exterior old door framing caulking	No Asbestos Detected
75.	Glue on Styrofoam panel behind brick by theater entrance	5% Asbestos
76.	Brown/white 12” x 12” vinyl floor tile under carpet at basement hallway	2% Asbestos
77.	Mastic for brown/white 12” x 12” vinyl floor tile under carpet at basement hallway	7% Asbestos
78.	Interior window glazing caulking at second floor main corridor	2% Asbestos

Observations and Conclusions:

1. Insulation inside wood fire door was found to contain asbestos.
2. Debris at crawl space above second floor ceiling plaster was found to contain asbestos.
3. Pipe insulation was found to contain asbestos.
4. Boiler insulation was found to contain asbestos.

5. Brown sink coating was found to contain <1% Asbestos. Per DEP the sink will have to be disposed as ACM.
6. Brown/white 12" x 12" vinyl floor tile was found to contain asbestos.
7. Mastic for brown/white 12" x 12" vinyl floor tile was found to contain asbestos.
8. Second layer flooring under new blue vinyl floor tile was found to contain asbestos.
9. Mastic for second layer flooring under new blue vinyl floor tile was found to contain asbestos.
10. Old vinyl floor tile under carpet was found to contain asbestos.
11. Mastic for old vinyl floor tile under carpet was found to contain asbestos.
12. Exterior grey caulking in stone sill was found to contain asbestos.
13. Glue on Styrofoam panel behind brick was found to contain asbestos.
14. Interior window glazing caulking was found to contain asbestos.
15. Duct insulation was assumed to contain asbestos.
16. Insulation inside boiler was assumed to contain asbestos.
17. Insulation inside incinerator was assumed to contain asbestos.
18. ACM debris was found throughout the boiler room. Access should be sealed and limited.
19. All windows are new. However, it appears that old frames exist behind new.
20. All other suspect materials were found not to contain asbestos. Hidden ACM may be found during demolition activities.

Polychlorinated Biphenyls (PCB's)-Electrical Equipment and Light Fixtures:
Observations and Conclusions
Visual inspection of various equipments such as light fixtures, thermostats, exit signs and switches was performed for the presence of PCB's and mercury. Ballasts in light fixtures were assumed not to contain PCB's since there were labels indicating that "No PCB's" was found. Tubes in light fixtures, thermostats, signs and switches were assumed to contain mercury. It would be very costly to test those equipments and dismantling would be required to access. Therefore, the above mentioned equipments should be disposed in an EPA approved landfill as part of the demolition project.

Lead Based Paint (LBP):
Observations and Conclusions
LBP was assumed to exit on painted surfaces. A school is not considered a regulated facility. All LBP activities performed, including waste disposal, should be in accordance with applicable Federal, State, or local laws, ordinances, codes or regulations governing evaluation and hazard reduction. In the event of discrepancies, the most protective requirements prevail. These requirements can be found in OSHA 29 CFR 1926-Construction Industry Standards, 29 CFR 1926.62-Construction Industry Lead Standards, 29 CFR 1910.1200-Hazards Communication, 40 CFR 261-EPA Regulations.

Oil Tanks:
Observations and Conclusions
There is an oil tank room with significant construction debris. There is a heavy oil smell and it appears that the tank is leaking. Additional investigation is recommended.

3.0 COST ESTIMATES:
The cost includes removal and disposal of all accessible ACM and other hazardous materials.

Location	Material	Approximate Quantity	Cost Estimate ($)
Throughout	Various Types of Flooring and Mastic	48,000 SF	240,000.00
	Miscellaneous Hazardous Materials	Unknown	8,500.00
	Wood Fire Doors	110 Total	22,000.00
	Interior Windows	40 Total	8,000.00

Location	Material	Approximate Quantity	Cost Estimate ($)
Various Locations	Pipe Insulation	1,000 LF	25,000.00
Second Floor Crawl Space	Pipe Insulation	1,000 LF	25,000.00
	Debris/Contamination	10,000 SF	70,000.00
Boiler Room	Pipe and Hard Joint Insulation	500 LF	20,000.00
	Boiler Insulation	220 SF	4,400.00
	Heat Exchanger Insulation	60 SF	400.00
	Duct Insulation	160 SF	3,200.00
	Boiler	1 Total	7,500.00
	Incinerator	1 Total	6,500.00
	ACM Debris	1,000 SF	5,000.00
Oil Tank	Oil Tank	1 Total	15,000.00
	Contamination	Unknown	15,000.00
Exterior	Caulking in Stone Sill	200 LF	4,500.00
Estimated costs for Testing related to the Oil Tank Room			4,500.00
Estimated costs for Design, Construction Monitoring and Air Sampling Services			45,500.00
		Total:	**550,000.00**

4.0 DESCRIPTION OF SURVEY METHODS AND LABORATORY ANALYSES:

Asbestos samples were collected using a method that prevents fiber release. Homogeneous sample areas were determined by criteria outlined in EPA document 560/5-85-030a.

Bulk material samples were analyzed using PLM and dispersion staining techniques with EPA method 600/M4-82-020.

Inspected By:

Leonard J. Busa
Asbestos Inspector (AI-030673)

5.0 LIMITATIONS AND CONDITIONS:

This report has been completed based on visual and physical observations made and information available at the time of the site visits, as well as an interview with the Owner's representatives. This report is intended to be used as a summary of available information on existing conditions with conclusions based on a reasonable and knowledgeable review of evidence found in accordance with normally accepted industry standards, state and federal protocols, and within the scope and budget established by the client. Any additional data obtained by further review must be reviewed by UEC and the conclusions presented herein may be modified accordingly.

This report and attachments, prepared for the exclusive use of Owner for use in an environmental evaluation of the subject site, are an integral part of the inspections and opinions should not be formulated without reading the report in its entirety. No part of this report may be altered, used, copied or relied upon without prior written permission from UEC, except that this report may be conveyed in its entirety to parties associated with Owner for this subject study.

GEN-FM-10-1: Sample Transfer-One Time
Revision 4.2
Revision Date: 1/05/2016
Effective Date: 1/05/2016

EMSL Analytical, Inc.

Sample Transfer Form

Receiving Lab:	**EMSL- Boston** **7 Constitution Way, Suite 107** **Woburn, MA 01801**	**Phone Number:**	781-933-8411
		Fax Number:	781-933-8412
Relinquished to:	**EMSL- Buffalo**	**Phone Number:**	
		Fax Number:	
Does new lab hold equivalent or additional accreditation? *		☒ Yes ☐ No	

EMSL Customer ID # (if known):	UEC63
Client Name:	Universal
Client Project:	Gibbs School - Arlington, MA
Tests to be Performed:	PLM
Date Received:	3/29
Date Relinquished:	3/29
Date Due:	3/31 at 9:20a
Special Instructions: (e.g. Work Order # , required qualifications, project specific procedures/modifications)	Use Ammar Dieb for reporting and billing contact.

RECEIVED
MAR 30 2016
BY:

Relinquished by (Signature):	**Date:** 3/29/16	**Received by (Signature):**	**Date:** FX 8:50 AM
Relinquished by (Signature):	**Date:**	**Received by (Signature):**	**Date:**

Customer Agreement- Please sign form and send to the receiving laboratory. By signing below, you agree to permit the above named receiving lab to transfer samples to a separate EMSL lab with equivalent qualifications* for analysis. The final report will be issued from the analyzing laboratory. Ensure any requirements are listed in special instructions.

Name (please print):	**Signature:**	**Agent of:**	**Date:**
standing agreement			

If this is a recurring project or sample type that may require samples to be relinquished on a regular basis, a Standing Agreement form must be completed.

* Receiving and analyzing labs shall be aware of required qualifications of project prior to transfer of samples.

Note: If customer has been notified and approved this transfer verbally or by e-mail, the receiving lab must sign for the customer above. EMSL employee filling out form on behalf of customer shall print name of person to whom they spoke, date agreement was received, and then sign under Signature.

OrderID: 141600926

141600926 1/4

CHAIN OF CUSTODY

Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702
Tel: (508) 628-5486 - Fax: (508) 628-5488
adieb@uec-env.com

Town/City: Arlington, MA Building Name Gibbs School

Sample	Result	Description of Material	Sample Location
1		wall plaster (WP)	2nd Fl Clay rm
2		WP	rm-1
3		WP	rc by Pre-School
4		ceiling plaster (CP)	rm-3
5		CP	rc by Gr 1/2
6		CP	Boiler rm
7		CP	Bsmt Kelliher Habilitation
8		glue daub for 1x1 AT (PW) above SAT-I	" " "
9		glue daub for 1x1 AT (PW) above SAT-I	" "
10		2x4 SAT-I	Bsmt rm by Music A
11		2x4 SAT-I	rm across from Sensory rm Bsmt
12		2x4 SAT-I	Bsmt hall by stair 4
13		1x1 AT-I (Frosty)	Toddler-2
14		AT-I	rm-3
15		AT-I	hall to Theater
16		AT-I	1st Fl rc by Gr 1/2
17		AT-I	Kelliher ~ Break rm (Bsmt)
18		CP-I (rough)	Studio J (Bsmt)
19		CP-I	Studio J
20		CP-I	Bsmt rm w/ Nurse

Reported By: [signature] Date: 3-28-16 Due Date: 48-hr

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2 of 4

CHAIN OF CUSTODY 141600926

Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702
Tel: (508) 628-5486 - Fax: (508) 628-5488
adieb@uec-env.com

Town/City: Arlington, MA Building Name Gibbs School

Sample	Result	Description of Material	Sample Location
21		CP-I	Rm w/ Nurse Sink
22		CP-I	rm w/ Nurse 1
23		Joint Compound (JC)	2nd FL Clay Room
24		JC	1st FL Transitional Kindergarten
25		wood fire door insulation (FD)	Top of stairwell by Toddler-2
26		FD	Clm-2
27		FD	ext. to Studio J
28		FD	Theatre costume room
29		TSI debris	crawlspace above plaster clg, 2nd FL
30		assumed roofing debris (paper)	" " "
31		assumed roofing debris (on wood)	" " "
32		(E) OFF EG	Studio J
33		(E) OFF EG	Boiler rm (Top of Stairs)
34		(E) OFF EG	Boiler rm (Catwalk)
35		(P)	Boiler rm
36		Boiler Insulation (BI)	side - I
37		(BI)	side - II
38		(BI)	rear
39		Black paint on Boiler - Front	
40		" " " " - side	

Reported By: Richard L. Bum Date: 3-28-16 Due Date: 48-hr

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CHAIN OF CUSTODY 141600926

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Town/City: Arlington, MA Building Name Gibbs School

Sample	Result	Description of Material	Sample Location
41		hard Brown Lab Tank	1st FL Group rm
42		hard Brown Lab Table	Clsm-1
43		Brown sink dp	Clay-rm
44		vertical caulk in Block	1973 - Dimmer offices
45		vert. caulk in Block	" " "
46		VT-E 12" (Brown w/white)	Bsmt, 1973, Kelliher Book rm
47		Black mastic #46	" " " "
48		VT-E	Bsmt 1973, hall by Theatre
49		BL (m) #48	" " "
50		VT-E	Bsmt Kelliher under carpet, hall outside Boiler Rm
51		BL (m) #50	↓ ↓ ↓
52		Brown Leveler ? @ #51	
53		carpet glue on #50	
54		BL (m) for VT-E	Bsmt under carpet, hall outside Kelliher
55		carpet glue on VT-E	" " " " offices
56		2nd Layer (light colored VT)	by stair-2 Bsmt under new Blue VT rm w/ Nurse
57		old VT under VT-E	Clsm-1
58		Black (m)? present #57	Clsm-1
59		old VT under carpet	Toddler-2
60		Black (m)? present? #59	Toddler-2

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CHAIN OF CUSTODY

Universal Environmental Consultants
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Framingham, MA 01702
Tel: (508) 628-5486 - Fax: (508) 628-5488
adieb@uec-env.com

Town/City: Arlington, Ma Building Name Gibbs School

Sample	Result	Description of Material	Sample Location
61		old vt under carpet	2nd FL hall outside Elevator
62		BC (m) #61	" " " "
63		VT-T on old vt	2nd FL Classroom
64		old linoleum under carpet	3rd FL hall outside Elevator
65		12" red vt	(1973) Theatre
66		12" Leopard VT	Transitional Kindergarten
67		mastic #66	" " " "
68		window fc caulk	front of main school (rt) EXTERIOR
69		win fc	" " main (Lft)
70		win fc	side of main school (by Theatre side)
71		grey caulk in stone sill	Front of main school
72		" " " "	" " "
73		(old) door fc	Door #5
74		(old) door fc	Door #5
75		Boards for styrofoam panel	behind Brick by Theatre ENTRANCE
76		VT-T under carpet, hall by	Bsmt, Kelliher Breakroom (addition?)
77		BC (m) #76	" " " "
78		interior wing L	2nd FL, room by classroom

Reported By: Leonard L Busa Date: 3-28-16 Due Date: 48-hr

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Tel/Fax: (716) 651-0030 / (716) 651-0394
http://www.EMSL.com / buffalolab@emsl.com

EMSL Order: 141600926
Customer ID: UEC63
Customer PO:
Project ID:

Attention: Ammar Dieb
Universal Environmental Consultants
12 Brewster Road
Framingham, MA 01702

Project: Gibbs School, Arlington, MA

Phone: (617) 984-9772
Fax: (508) 628-5488
Received Date: 03/30/2016 8:50 AM
Analysis Date: 03/30/2016
Collected Date:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
1 *141600926-0001*	2nd fl clay room - wall plaster (WP)	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
2 *141600926-0002*	crm-1 - WP	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
3 *141600926-0003*	mc danel by pre-school - WP	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
4-white *141600926-0004*	crm-3 - ceiling plaster (CP)	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
4-gray *141600926-0004A*	crm-3 - ceiling plaster (CP)	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
5 *141600926-0005*	mc by gr 1/2 - CP	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
6 *141600926-0006*	boiler rm - CP	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
7-white *141600926-0007*	bsmt Kelliher Habitation - CP	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
7-gray *141600926-0007A*	bsmt Kelliher Habitation - CP	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
8 *141600926-0008*	bsmt Kelliher Habitation - glue daub for 1x1 PW AT above SAT-I	Brown Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
Non-Friable organically bound materials present a problem matrix. EMSL recommends gravimetric reduction prior to analysis.					
9 *141600926-0009*	bsmt Kelliher Habitation - glue daub for 1x1 PW AT above SAT-I	Brown Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
Non-Friable organically bound materials present a problem matrix. EMSL recommends gravimetric reduction prior to analysis.					
10 *141600926-0010*	bsmt rm by music A - 2x4 SAT-I	Gray/White Fibrous Homogeneous	50% Cellulose 50% Glass		None Detected
11 *141600926-0011*	rm across from sensory rm bsmt - 2x4 SAT-I	Gray Fibrous Homogeneous	50% Cellulose 50% Glass		None Detected
12 *141600926-0012*	bsmt hall by stair 4 - 2x4 SAT-I	Gray Fibrous Homogeneous	50% Cellulose 50% Glass		None Detected
13 *141600926-0013*	toddler-2 - 1x1 AT-I (frosty)	Gray Fibrous Homogeneous	75% Glass	25% Non-fibrous (Other)	None Detected

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http://www.EMSL.com / buffalolab@emsl.com

EMSL Order: 141600926
Customer ID: UEC63
Customer PO:
Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
14 *141600926-0014*	crm-3 - 1x1 AT-I	Gray Fibrous Homogeneous	75% Glass	25% Non-fibrous (Other)	None Detected
15 *141600926-0015*	hall to theater - 1x1 AT-I	Gray Fibrous Homogeneous	75% Glass	25% Non-fibrous (Other)	None Detected
16 *141600926-0016*	1st fl mc by gr 1/2 - 1x1 AT-I	Gray Fibrous Homogeneous	75% Glass	25% Non-fibrous (Other)	None Detected
17 *141600926-0017*	Kelliher-break rm (bsmt) - 1x1 AT-I	Gray Fibrous Homogeneous	75% Glass	25% Non-fibrous (Other)	None Detected
18 *141600926-0018*	Studio J (bsmt) - CP-I (rough)	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
19 *141600926-0019*	Studio J - CP-I	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
20 *141600926-0020*	bsmt rm w/nurse - CP-I	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
21 *141600926-0021*	rm w/nurse bsmt - CP-I	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
22 *141600926-0022*	rm w/nurse bsmt - CP-I	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
23-white *141600926-0023*	2nd fl clay room - joint compound (JC)	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
23-gray *141600926-0023A*	2nd fl clay room - joint compound (JC)	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
24 *141600926-0024*	1st fl transitional kindergarten - JC	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
25 *141600926-0025*	top of stairwell by toddler -2 - wood fire door insulation (FD)	White Fibrous Homogeneous		75% Non-fibrous (Other)	20% Amosite 5% Chrysotile
26 *141600926-0026*	crm-2 - FD	White Fibrous Homogeneous		73% Non-fibrous (Other)	20% Amosite 7% Chrysotile
27 *141600926-0027*	ent to Studio J - FD	White Fibrous Homogeneous		80% Non-fibrous (Other)	20% Amosite
28 *141600926-0028*	theater costume room - FD	White Fibrous Homogeneous		88% Non-fibrous (Other)	10% Amosite 2% Chrysotile
29 *141600926-0029*	crawlspace above pla clg, 2nd fl - TSI debris	Gray Fibrous Homogeneous	50% Cellulose		50% Chrysotile
30 *141600926-0030*	crawlspace above pla clg, 2nd fl - assumed roofing debris (paper)	Black Fibrous Homogeneous	2% Cellulose	98% Non-fibrous (Other)	None Detected
31 *141600926-0031*	crawlspace above pla clg, 2nd fl - assumed roofing debris (on wood)	Brown/Black Fibrous Homogeneous	50% Cellulose	50% Non-fibrous (Other)	None Detected

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Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
32 *141600926-0032*	Studio J - E off FG	Gray Fibrous Homogeneous	2% Cellulose 10% Glass	88% Non-fibrous (Other)	None Detected
33 *141600926-0033*	boiler rm (top of stairs) - E off FG	Gray Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
34 *141600926-0034*	boiler rm (@ wtc mtc) - E off FG	Gray Fibrous Homogeneous	15% Glass	85% Non-fibrous (Other)	None Detected
35 *141600926-0035*	boiler rm - P1	Tan Fibrous Homogeneous	50% Cellulose		50% Chrysotile
36 *141600926-0036*	side-I - boiler insulation B1	Gray/White Fibrous Homogeneous	20% Glass	80% Non-fibrous (Other)	None Detected
37 *141600926-0037*	side-II - B1	Gray/White Fibrous Homogeneous	10% Glass	90% Non-fibrous (Other)	None Detected
38 *141600926-0038*	rear - B1	Gray Fibrous Homogeneous		60% Non-fibrous (Other)	40% Chrysotile
39 *141600926-0039*	black paint on boiler, front	Brown/Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
40 *141600926-0040*	black paint on boiler, side	Brown/Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
41 *141600926-0041*	1st fl group rm - hard brown lab table	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
42 *141600926-0042*	crm-1 - hard brown lab table	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
43 *141600926-0043*	clay-rm - brown sink dp	Black Fibrous Homogeneous		100% Non-fibrous (Other)	<1% Chrysotile
44 *141600926-0044*	1973-drummer offices - verticle caulk in block	Tan/White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
45 *141600926-0045*	1973-drummer offices - vert caulk in block	Tan/White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
46 *141600926-0046*	bsmt, 1973, Kelliher break rm - VT-I 12" (brown w/white)	Brown Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
47 *141600926-0047*	bsmt, 1973, Kelliher break rm - black mastic #46	Black Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
48 *141600926-0048*	bsmt, 1973, hall by theater - VT-I	Brown Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
49 *141600926-0049*	bsmt, 1973, hall by theater - bl, M #48	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
50 *141600926-0050*	bsmt, Kelliher, under carpet, hall outside boiler rm - VT-I	Tan Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile

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Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
51 *141600926-0051*	bsmt, Kelliher, under carpet, hall outside boiler rm - bl, M #50	Black Fibrous Homogeneous		93% Non-fibrous (Other)	7% Chrysotile
52 *141600926-0052*	bsmt, Kelliher, under carpet, hall outside boiler rm - brown leveler? @ #51	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
53 *141600926-0053*	bsmt, Kelliher, under carpet, hall outside boiler rm - carpet glue on #50	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
54 *141600926-0054*	under carpet, hall outside, bsmt, Kelliher - bl, M for VT-l	Black Fibrous Homogeneous		93% Non-fibrous (Other)	7% Chrysotile
55 *141600926-0055*	under carpet, hall outside, bsmt, Kelliher - carpet glue on VT-l	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
56 *141600926-0056*	under new blue VT rm w/nurse, by stair 2/bsmt - 2nd layer (light colored VT)	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
57 *141600926-0057*	crm-1 - old VT under VT-l	Brown Fibrous Homogeneous		97% Non-fibrous (Other)	3% Chrysotile
58 *141600926-0058*	crm-1 - black M? present #57	Black Fibrous Homogeneous		90% Non-fibrous (Other)	10% Chrysotile
59 *141600926-0059*	toddler-2 - old VT under carpet	Brown Fibrous Homogeneous		97% Non-fibrous (Other)	3% Chrysotile
60 *141600926-0060*	toddler-2 - black M? present #59	Black Fibrous Homogeneous		90% Non-fibrous (Other)	10% Chrysotile
61 *141600926-0061*	2nd fl hall outside elevator - old VT under carpet	Brown Fibrous Homogeneous		95% Non-fibrous (Other)	5% Chrysotile
62 *141600926-0062*	2nd fl hall outside elevator - bl, M #61	Black Fibrous Homogeneous		90% Non-fibrous (Other)	10% Chrysotile
63 *141600926-0063*	2nd fl clay rm - VT-l on old VT	Tan Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
64 *141600926-0064*	2nd fl hall outside elevator - old linoleum under carpet	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
65 *141600926-0065*	1973, theater - 12" red VT	Red Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66 *141600926-0066*	transitional kindergarten - 12" leopard VT	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
67 *141600926-0067*	transitional kindergarten - mastic #66	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
68 *141600926-0068*	front of main school (rt) exterior - window fr caulk	Brown Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

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Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
69 *141600926-0069*	front of main school (lft) exterior - win fr	Brown Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
70 *141600926-0070*	side of main school (by theater side) - win fr	Brown Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
71 *141600926-0071*	front of main school (by theater side) - gray caulk in stone sill	Gray Fibrous Homogeneous		95% Non-fibrous (Other)	5% Chrysotile
72 *141600926-0072*	front of main school (by theater side) - gray caulk in stone sill	Gray Fibrous Homogeneous		95% Non-fibrous (Other)	5% Chrysotile
73 *141600926-0073*	door #5 (by theater side) - (old) door fr	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
74 *141600926-0074*	door #5 (by theater side) - (old) door fr	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
75 *141600926-0075*	behind brick by theater entrance - bladh for styrofoam panel	Black Fibrous Homogeneous		95% Non-fibrous (Other)	5% Chrysotile
76 *141600926-0076*	under carpet hall by bsmt, Kelliher break room (addition ?) - VT-I	Tan Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile
77 *141600926-0077*	under carpet hall by bsmt, Kelliher break room (addition ?) - bl, M #76	Black Fibrous Homogeneous		93% Non-fibrous (Other)	7% Chrysotile
78 *141600926-0078*	2nd fl, mc, by clay rm - interior wing L	Gray Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile

Analyst(s)

Shauna Strnad (52)
Tom Hanes (29)

Rhonda McGee

Rhonda McGee, Laboratory Manager
or Other Approved Signatory

Initial Report From: 03/31/2016 09:18:02

Appendix F

Feasibility Study
Design Estimate

Feasibility Design Estimate

Arlington Gibbs School
RENOVATIONS

Arlington, MA

PM&C LLC
20 Downer Avenue, Suite 1c
Hingham, MA 02043
(T) 781-740-8007
(F) 781-740-1012

Prepared for:

HMFH Architects, Inc

April 25, 2016

PM&C

Arlington Gibbs School
RENOVATIONS
Arlington, MA

25-Apr-16

Feasibility Design Estimate

MAIN CONSTRUCTION COST SUMMARY

	Construction Start	Gross Floor Area	$/sf	Estimated Construction Cost
RENOVATION				
RENOVATE EXISTING SCHOOL		69,000	$161.35	$11,133,002
REMOVE HAZARDOUS MATERIALS [1]		1	ls	$500,000
SITEWORK				$409,400
SUB-TOTAL	Apr-17	69,000	$174.53	$12,042,402
ESCALATION TO START - (assumed 4% PA)	4.0%			$481,696
DESIGN AND PRICING CONTINGENCY	12%			$1,445,088
SUB-TOTAL		69,000	$202.45	$13,969,186
GENERAL CONDITIONS				$1,117,535
GENERAL REQUIREMENTS	3.00%			$419,076
BONDS	1.00%			$139,692
INSURANCE	1.25%			$174,615
PERMIT				NIC
OVERHEAD AND FEE	3.00%			$419,076
GMP CONTINGENCY				$419,076
TOTAL OF ALL CONSTRUCTION	Apr-17	69,000	$241.42	**$16,658,256**

ALTERNATES

ALTERNATE HVAC -1

Add DX partial cooling for classrooms	ADD	**$317,400**

ALTERNATE HVAC -2

Add displacement ventilation with partial cooling and dehumidification	ADD	**$414,000**

[1] Pricing from UEC report dated 3/31/16 and excludes testing and design fees

This Feasibility Design cost estimate was produced from drawings, narratives, outline specifications and other documentation prepared by HMFH Architects Inc. and their design team dated April 6, 2016. Design and engineering changes occurring subsequent to the issue of these documents have not been incorporated in this estimate.

This estimate includes all direct construction costs, construction manager's overhead, fee and design contingency. Cost escalation assumes start dates indicated.

Bidding conditions are expected to be public bidding under Chapter 149a of the Massachusetts General Laws to pre-qualified

construction managers, and pre-qualified sub-contractors, open specifications for materials and manufactures.

The estimate is based on prevailing wage rates for construction in this market and represents a reasonable opinion of cost. It is not a prediction of the successful bid from a contractor as bids will vary due to fluctuating market conditions, errors and omissions, proprietary specifications, lack or surplus of bidders, perception of risk, etc. Consequently the estimate is expected to fall within the range of bids from a number of competitive contractors or subcontractors, however we do not warrant that bids or negotiated prices will not vary from the final construction cost estimate.

ITEMS NOT CONSIDERED IN THIS ESTIMATE

Items not included in this estimate are:

- Land acquisition, feasibility, and financing costs
- All professional fees and insurance
- Site or existing conditions surveys investigations costs, including to determine subsoil conditions
- All Furnishings, Fixtures and Equipment
- Items identified in the design as Not In Contract (NIC)
- Items identified in the design as by others
- Owner supplied and/or installed items as indicated in the estimate
- Utility company back charges, including work required off-site
- Work to City streets and sidewalks, (except as noted in this estimate)
- Construction contingency

PM&C

Arlington Gibbs School
RENOVATIONS
Arlington, MA

25-Apr-16

Feasibility Design Estimate

GFA 69,000

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
RENOVATION TO EXISTING BUILDING						
A10	**FOUNDATIONS**					
	A1010	Standard Foundations	$5,000			
	A1020	Special Foundations	$0			
	A1030	Lowest Floor Construction	$115,000	**$120,000**	$1.74	1.1%
B10	**SUPERSTRUCTURE**					
	B1010	Upper Floor Construction	$78,000			
	B1020	Roof Construction	$90,000	**$168,000**	$2.43	1.5%
B20	**EXTERIOR CLOSURE**					
	B2010	Exterior Walls	$133,968			
	B2020	Windows/Curtainwall	$280,475			
	B2030	Exterior Doors	$81,146	**$495,589**	$7.18	4.5%
B30	**ROOFING**					
	B3010	Roof Coverings	$194,500			
	B3020	Roof Openings	$0	**$194,500**	$2.82	1.7%
C10	**INTERIOR CONSTRUCTION**					
	C1010	Partitions	$548,143			
	C1020	Interior Doors	$345,000			
	C1030	Specialties/Millwork	$432,404	**$1,325,547**	$19.21	11.9%
C20	**STAIRCASES**					
	C2010	Stair Construction	$32,000			
	C2020	Stair Finishes	$56,585	**$88,585**	$1.28	0.8%
C30	**INTERIOR FINISHES**					
	C3010	Wall Finishes	$459,820			
	C3020	Floor Finishes	$434,285			
	C3030	Ceiling Finishes	$346,557	**$1,240,662**	$17.98	11.1%
D10	**CONVEYING SYSTEMS**					
	D1010	Elevator	$140,000	**$140,000**	$2.03	1.3%
D20	**PLUMBING**					
	D20	Plumbing	$1,173,000	**$1,173,000**	$17.00	10.5%
D30	**HVAC**					
	D30	HVAC	$2,346,000	**$2,346,000**	$34.00	21.1%
D40	**FIRE PROTECTION**					
	D40	Fire Protection	$414,000	**$414,000**	$6.00	3.7%
D50	**ELECTRICAL**					
	D5010	Electrical Systems	$2,208,000	**$2,208,000**	$32.00	19.8%
E10	**EQUIPMENT**					

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Arlington Gibbs School
RENOVATIONS
Arlington, MA

25-Apr-16

Feasibility Design Estimate

GFA 69,000

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
RENOVATION TO EXISTING BUILDING						
	E10	Equipment	$305,000	**$305,000**	$4.42	2.7%
E20	**FURNISHINGS**					
	E2010	Fixed Furnishings	$491,880			
	E2020	Movable Furnishings	NIC	**$491,880**	$7.13	4.4%
F10	**SPECIAL CONSTRUCTION**					
	F10	Special Construction	$0	**$0**	$0.00	0.0%
F20	**SELECTIVE BUILDING DEMOLITION**					
	F2010	Building Elements Demolition	$422,239			
	F2020	Hazardous Components Abatement	$0	**$422,239**	$6.12	3.8%
TOTAL DIRECT COST (Trade Costs)				***$11,133,002***	*$161.35*	*100.0%*

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Arlington Gibbs School 25-Apr-16
RENOVATIONS
Arlington, MA

Feasibility Design Estimate **GFA** 69,000

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	RENOVATION TO EXISTING BUILDING						
	GROSS FLOOR AREA CALCULATION						
	First Floor			28,353			
	Second Floor			27,377			
	Third Floor			13,270			
	TOTAL GROSS FLOOR AREA (GFA)				**69,000**	***GSF***	
	A10 FOUNDATIONS						
	A1010 STANDARD FOUNDATIONS						
	Allowance for minor repair to cracked/spalled foundation wall	**1**	ls	5,000.00	5,000		
	SUBTOTAL					5,000	
	A1020 SPECIAL FOUNDATIONS						
	No work in this section						
	SUBTOTAL						
	A1030 LOWEST FLOOR CONSTRUCTION						
	Allowance to repair front entry steps	**1**	ls	30,000.00	30,000		
	Allowance to replace classroom wing entrance stairs with larger landing	**2**	loc	25,000.00	50,000		
	Cutting and patching for new plumbing	**1**	ls	25,000.00	25,000		
	Equipment pads	**1**	ls	10,000.00	10,000		
	SUBTOTAL					115,000	
	TOTAL - FOUNDATIONS						**$120,000**
	B10 SUPERSTRUCTURE						
	B1010 FLOOR CONSTRUCTION						
	CMU Seismic support at CMU walls to remain; limited scope	**1**	ls	10,000.00	10,000		
	Rebuild existing ramp in classroom wing to meet ADA code	**1**	loc	25,000.00	25,000		
	Allow for reframing at openings	**1**	ls	10,000.00	10,000		
	New penetrations to existing structure	**1**	ls	20,000.00	20,000		
	Infill existing stair opening	**200**	sf	40.00	8,000		
	Fire stopping floors	**1**	ls	5,000.00	5,000		
	SUBTOTAL					78,000	
	B1020 ROOF CONSTRUCTION						
	Temporary shoring at existing cold storage room roof	**1**	ls	15,000.00	15,000		
	Repair to existing cold storage room roof	**1**	ls	75,000.00	75,000		
	SUBTOTAL					90,000	
	TOTAL - SUPERSTRUCTURE						**$168,000**
	B20 EXTERIOR CLOSURE						
	B2010 EXTERIOR WALLS						
	Exterior skin						
	Allowance to repoint/repair existing brick; allow 500SF	**500**	sf	35.00	17,500		
	Allowance to repair masonry site walls at 1973 entry terrace	**1**	ls	10,000.00	10,000		
	Repair rusted steel lintels/angles/ allow 100LF	**200**	lf	280.00	56,000		

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Arlington Gibbs School 25-Apr-16
RENOVATIONS
Arlington, MA

Feasibility Design Estimate **GFA** 69,000

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	RENOVATION TO EXISTING BUILDING						
	Repair spalled/corroded concrete wall reinforcing above Gym/Aud wing	**4**	loc	2,400.00	9,600		
	Allowance to repair brick chimney	**1**	ls	5,000.00	5,000		
	Remove and replace water damaged section of inside face of exterior wall at Tuft Street top floor façade	**2,562**	sf	14.00	35,868		
	SUBTOTAL					133,968	
B2020	**WINDOWS/CURTAINWALL**	*2,266*	*sf*		-		
	Replace existing entrance curtainwall with new at 1973 wing	**798**	sf	120.00	95,760		
	Replace existing entrance sloped curtainwall with new at 1973 wing	**640**	sf	130.00	83,200		
	Replace existing windows with new at 1973 wing	**828**	sf	100.00	82,800		
	Replace existing sashes to 1928 building after removal of window air conditioning units; allow 15 locations	**15**	loc	260.00	3,900		
	Louvers	**1**	ls	5,000.00	5,000		
	Backer rod & double sealant	**755**	lf	9.00	6,795		
	Wood blocking at openings	**755**	lf	4.00	3,020		
	SUBTOTAL					280,475	
B2030	**EXTERIOR DOORS**						
	New glazed aluminum entrance doors	**6**	pr	8,000.00	48,000		
	New glazed aluminum entrance doors	**3**	ea	4,000.00	12,000		
	Auto opening	**2**	loc	4,000.00	8,000		
	HM door and frame including hardware	**3**	ea	2,000.00	6,000		
	HM door and frame including hardware	**1**	pr	4,000.00	4,000		
	Backer rod & double sealant	**242**	lf	9.00	2,178		
	Wood blocking at openings	**242**	lf	4.00	968		
	SUBTOTAL					81,146	
	TOTAL - EXTERIOR CLOSURE						**$495,589**
B30	***ROOFING***						
B3010	**ROOF COVERINGS**						
	Sloped roofing						
	Replace existing asphalt roof at 1973 addition	**5,750**	sf	26.00	149,500		
	New gutters and downspouts	**1**	ls	20,000.00	20,000		
	Miscellaneous Roofing						
	Patching of existing roofing to remain for new MEP work	**1**	ls	20,000.00	20,000		
	New roof ladder from grade; includes lockable gate	**1**	ls	5,000.00	5,000		
	SUBTOTAL					194,500	
B3020	**ROOF OPENINGS**						
	No work in this section						
	SUBTOTAL					-	
	TOTAL - ROOFING						**$194,500**
C10	***INTERIOR CONSTRUCTION***						
C1010	**PARTITIONS**						
	GWB						
	6" MS w/ 2 layers GWB e/s w/ insulation	**10,206**	sf	15.85	161,765		
	6" MS w/ 5/8" GWB o/s batt insulation	**1,862**	sf	10.05	18,713		
	Stairs	**1,204**	sf	22.00	26,488		
	Plumbing chase	**336**	sf	20.00	6,720		

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Arlington Gibbs School 25-Apr-16
RENOVATIONS
Arlington, MA

Feasibility Design Estimate **GFA** 69,000

		DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
		RENOVATION TO EXISTING BUILDING						
110		Patch existing walls including creating new openings and modifying door openings to meet code	**69,000**	gfa	3.00	207,000		
111		Sealants & caulking at partitions	**13,608**	sf	0.50	6,804		
112		Rough blocking to partitions	**851**	lf	3.00	2,553		
113		Operable partitions	**1,056**	sf	75.00	79,200		
114		*Interior glazing*						
115		Butt glazing	**1**	ls	20,000.00	20,000		
116		Interior Curtainwall at Vestibules	**210**	sf	90.00	18,900		
117		SUBTOTAL					548,143	
118								
119	**C1020**	**INTERIOR DOORS**						
120		Allowance for new doors and to replace existing doors with new ADA compliant openings	**69,000**	gfa	5.00	345,000		
121		SUBTOTAL					345,000	
122								
123	**C1030**	**SPECIALTIES / MILLWORK**						
124		Toilet Partitions; handicapped; Phenolic	**8**	ea	1,803.00	14,424		
125		Toilet Partitions; Phenolic	**16**	ea	1,300.00	20,800		
126		Toilet Partitions; urinal screens	**8**	ea	310.00	2,480		
127		Miscellaneous metal to ceiling supported toilet partitions	**24**	ea	200.00	4,800		
128		Toilet Accessories						
129		Large bathroom	**8**	rms	3,000.00	24,000		
130		Individual bathroom	**7**	rms	1,500.00	10,500		
131		Marker boards/tackboards in teaching spaces	**69,000**	gfa	1.00	69,000		
132		Building directory	**1**	loc	3,000.00	3,000		
133		Bronze dedication plaque	**1**	loc	2,500.00	2,500		
134		Staff mailboxes/casework	**1**	ls	5,000.00	5,000		
135		Room Signs	**69,000**	gfa	0.25	17,250		
136		Fire extinguisher cabinets	**20**	ea	350.00	7,000		
137		Janitors Closet Accessories	**3**	rms	300.00	900		
138		Lockers	**500**	opng	180.00	90,000		
139		Media center circulation desk	**1**	ls	15,000.00	15,000		
140		Modify stage for new lift	**1**	ls	5,000.00	5,000		
141		*Administration room*						
142		Reception desk	**1**	ls	20,000.00	20,000		
143		Miscellaneous metals throughout building	**69,000**	sf	1.00	69,000		
144		Miscellaneous sealants throughout building	**69,000**	sf	0.75	51,750		
145		SUBTOTAL					432,404	
146								
147		***TOTAL - INTERIOR CONSTRUCTION***						**$1,325,547**
148								
149								
150	***C20***	***STAIRCASES***						
151								
152	**C2010**	**STAIR CONSTRUCTION**						
153		Metal pan stair; egress stair	**1**	flt	30,000.00	30,000		
154		Concrete fill to stairs	**1**	flt	2,000.00	2,000		
155		SUBTOTAL					32,000	
156								
157	**C2020**	**STAIR FINISHES**						
158		High performance coating to new and existing stairs including all railings etc.	**9**	flt	3,000.00	27,000		
159		Rubber tile at new and existing stairs - landings	**900**	sf	10.00	9,000		
160		Rubber tile at new and existing stairs - treads & risers	**1,080**	lft	19.06	20,585		
161		SUBTOTAL					56,585	

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Arlington Gibbs School 25-Apr-16
RENOVATIONS
Arlington, MA

Feasibility Design Estimate **GFA** 69,000

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	RENOVATION TO EXISTING BUILDING						
	TOTAL - STAIRCASES						**$88,585**
	C30 INTERIOR FINISHES						
	C3010 WALL FINISHES						
	Paint to walls etc.	**69,000**	gfa	2.50	172,500		
	Ceramic tile wainscot, 4ft high at corridor walls	**6,644**	sf	20.00	132,880		
	Ceramic tile, full height	**7,020**	sf	22.00	154,440		
	SUBTOTAL					459,820	
	C3020 FLOOR FINISHES						
	Poured epoxy flooring at kitchen	**1,500**	sf	12.00	18,000		
	Carpet	**6,696**	sf	4.33	28,994		
	LFT	**44,959**	sf	4.00	179,836		
	Ceramic tile to toilets	**2,362**	sf	20.00	47,240		
	Miscellaneous patching at existing gym wood flooring	**5,600**	sf	2.00	11,200		
	Sealed concrete	**983**	sf	1.50	1,475		
	Rubber base	**11,500**	lf	2.50	28,750		
	Ceramic tile base	**780**	lf	16.00	12,480		
	Floor prep	**53,155**	sf	2.00	106,310		
	SUBTOTAL					434,285	
	C3030 CEILING FINISHES						
	ACT, 2x2	**53,155**	sf	5.00	265,775		
	GWB ceiling	**2,362**	sf	10.00	23,620		
	Spray acoustic at exposed gym ceiling	**5,600**	sf	8.00	44,800		
	Paint GWB	**2,362**	sf	1.00	2,362		
	Soffits	**1**	ls	10,000.00	10,000		
	SUBTOTAL					346,557	
	TOTAL - INTERIOR FINISHES						**$1,240,662**
	D10 CONVEYING SYSTEMS						
	Replace elevator cab and mechanism	**1**	loc	90,000.00	90,000		
	New stage lift	**1**	loc	25,000.00	25,000		
	New MZ level lift	**1**	loc	25,000.00	25,000		
	SUBTOTAL					140,000	
	TOTAL - CONVEYING SYSTEMS						**$140,000**
	D20 PLUMBING						
	D20 PLUMBING, GENERALLY						
	New plumbing system with minimal reuse of existing pipe distribution	**69,000**	gfa	17.00	1,173,000		
	SUBTOTAL					1,173,000	
	TOTAL - PLUMBING						**$1,173,000**
	D30 HVAC						
	D30 HVAC, GENERALLY						

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Arlington Gibbs School 25-Apr-16
RENOVATIONS
Arlington, MA

Feasibility Design Estimate **GFA** 69,000

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	RENOVATION TO EXISTING BUILDING						
219	New heating and ventilating systems, reuse and convert existing steam boiler. A/C to admin, health, lobby, media center, cafeteria, gym, music, head end room, auditorium and interior occupied spaces.	**69,000**	gfa	34.00	2,346,000		
220	SUBTOTAL					2,346,000	
221							
222	***TOTAL - HVAC***						**$2,346,000**
223							
224							
225	***D40 FIRE PROTECTION***						
226							
227	**D40 FIRE PROTECTION, GENERALLY**						
228	New sprinkler system	**69,000**	gfa	6.00	414,000		
229	SUBTOTAL					414,000	
230							
231	***TOTAL - FIRE PROTECTION***						**$414,000**
232							
233							
234	***D50 ELECTRICAL***						
235							
236	**D5010 COMPLETE ELECTRICAL SYSTEMS**						
237	Reuse main switchboard and select branch panelboards, New gas fired generator to service life safety, boilers and pumps, new equipment wiring, new lighting and branch, supplemental upgrades to fire alarm system, all new technology systems, intrusion control and CCTV	**69,000**	gfa	32.00	2,208,000		
238	SUBTOTAL					2,208,000	
239							
240	***TOTAL - ELECTRICAL***						**$2,208,000**
241							
242							
243	***E10 EQUIPMENT***						
244							
245	**E10 EQUIPMENT, GENERALLY**						
246	New kitchen equipment	**1,500**	sf	200.00	300,000		
247	Residential appliances	**1**	ls	5,000.00	5,000		
248	Gym equipment				ETR		
249	SUBTOTAL					305,000	
250							
251	***TOTAL - EQUIPMENT***						**$305,000**
252							
253							
254	***E20 FURNISHINGS***						
255							
256	**E2010 FIXED FURNISHINGS**						
257	Entry mats & frames - recessed with carpet/rubber strips	**200**	sf	45.00	9,000		
258	Window blinds	**1**	ls	70,000.00	70,000		
259	*Classrooms*	*20*	*rms*				
260	Base cabinets and plam counters	**320**	lf	300.00	96,000		
261	Wall cabinets	**320**	lf	180.00	57,600		
262	Tall storage	**20**	ea	1,400.00	28,000		
263	*Science Classrooms*	*4*	*rms*				
264	Base cabinets and Epoxy counters	**224**	lf	450.00	100,800		
265	Wall cabinets	**224**	lf	300.00	67,200		
266	Tall storage	**8**	ea	1,400.00	11,200		
267	*FACS/Art*	*2*	*rms*				
268	Base cabinets and plam counters	**32**	lf	300.00	9,600		
269	Wall cabinets	**32**	lf	180.00	5,760		
270	Tall storage	**4**	ea	1,400.00	5,600		
271	*Mail/Copy*						

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Arlington Gibbs School 25-Apr-16
RENOVATIONS
Arlington, MA

Feasibility Design Estimate **GFA** 69,000

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	RENOVATION TO EXISTING BUILDING						
	Base cabinets and plam counters	**18**	lf	300.00	5,400		
	Wall cabinets	**18**	lf	180.00	3,240		
	Nurses						
	Base cabinets and plam counters	**16**	lf	300.00	4,800		
	Wall cabinets	**16**	lf	180.00	2,880		
	Tall storage	**2**	ea	1,400.00	2,800		
	Kitchenette						
	Base cabinets and plam counters	**25**	lf	300.00	7,500		
	Wall cabinets	**25**	lf	180.00	4,500		
	SUBTOTAL					491,880	
E2020	**MOVABLE FURNISHINGS**						
	All movable furnishings to be provided and installed by owner						
	SUBTOTAL					NIC	
	TOTAL - FURNISHINGS						**$491,880**
F10	***SPECIAL CONSTRUCTION***						
F10	**SPECIAL CONSTRUCTION**						
	No items in this section						
	SUBTOTAL						
	TOTAL - SPECIAL CONSTRUCTION						
F20	***SELECTIVE BUILDING DEMOLITION***						
F2010	**BUILDING ELEMENTS DEMOLITION**						
	Demolish bathroom walls including patching for new MZ lift	**1**	ls	10,000.00	10,000		
	Remove existing Windows/Curtainwall	**2,266**	sf	6.00	13,596		
	Remove existing CMU walls at lower level	**7,350**	sf	4.00	29,400		
	Remove existing GWB walls	**10,374**	sf	2.00	20,748		
	Demolish existing stairs	**2**	flt	5,000.00	10,000		
	Demolish existing floor slab	**2,362**	sf	12.00	28,344		
	Remove floor finishes	**55,517**	sf	2.00	111,034		
	Remove ceilings	**61,117**	sf	1.00	61,117		
	Miscellaneous demo	**69,000**	gfa	1.50	103,500		
	Remove MEP; cut and cap with trades	**69,000**	gfa	0.50	34,500		
	SUBTOTAL					422,239	
F2020	**HAZARDOUS COMPONENTS ABATEMENT**						
	See summary						
	SUBTOTAL						
	TOTAL - SELECTIVE BUILDING DEMOLITION						**$422,239**

PM&C

Edward Devotion School
Addition & Renovations
Brookline, MA

30-Mar-15

Schematic Design Estimate

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
SITEWORK							
G	***SITEWORK***						
G10	**SITE PREPARATION & DEMOLITION**						
	Site construction fence/barricades	**1,000**	lf	14.00	14,000		
	Remove existing play structures	**1**	ls	10,000	10,000		
	Miscellaneous demolition	**1**	ls	20,000	20,000		
	Site Earthwork						
	Allowance to alter grading to deal with drainage	**1**	ls	50,000.00	50,000		
	Silt fence/erosion control, wash bays, stock piles	**1,000**	lf	15.00	15,000		
	Construction entrance	**1**	ls	10,000.00	10,000		
	SUBTOTAL					$119,000	
G20	**SITE IMPROVEMENTS**						
	New exterior ramp	**1**	ls	50,000.00	50,000		
	Landscaping						
	Miscellaneous landscape repairs/upgrades	**1**	ls	30,000.00	30,000		
	SUBTOTAL					80,000	
G30	**CIVIL MECHANICAL UTILITIES**						
	Water supply						
	New DI piping; 6"	**300**	lf	100.00	30,000		
	FD connection	**1**	loc	2,000.00	2,000		
	Gate valves	**2**	loc	750.00	1,500		
	Connect to existing line (Wet Taps)	**1**	loc	10,000.00	10,000		
	Sanitary sewer						
	Grease trap	**1**	loc	15,000.00	15,000		
	Storm water						
	Allowance to correct drainage/flooding issues	**1**	ls	30,000.00	30,000		
	SUBTOTAL					$88,500	
G40	**ELECTRICAL UTILITIES**						
	Power						
	Manhole, new	**1**	ea	9,000.00	9,000		
	Primary ductbank						
	Ductbank AA 2-4" PVC conduits	**150**	lf	60.00	9,000		
	Primary cabling	**150**	lf		Utility company		
	Pad mounted transformer	**1**	ea		Utility company		
	Transformer pad	**1**	ea	2,500.00	2,500		
	Secondary ductbank						
	Secondary ductbank BB 6-4" with 3000A cabling	**70**	lf	820.00	57,400		
	Communications						
	Manhole, new	**1**	ea	9,000.00	9,000		
	Communications ductbank CC						
	4-4" PVC conduits	**150**	lf	100.00	15,000		
	Cabling	**150**	lf		Utility company		
	Site Lighting						
	Lighting allowance	**1**	ls	20,000.00	20,000		
	SUBTOTAL					121,900	
	TOTAL - SITE DEVELOPMENT						***$409,400***

H M
F H

OTTOSON MIDDLE SCHOOL
STUDY FOR ADDITION
ARLINGTON, MA

APRIL 25, 2016

HMFH ARCHITECTS

130 Bishop Allen Drive, Cambridge, MA 02139 617 492 2200 hmfh.com

Table of Contents

Acknowledgement

Study Team

HMFH Architects, Inc. Architect
Foley Buhl Roberts & Associates, Inc. Structural Engineer
PM&C, LLC Cost Estimator
R.W. Sullivan Code Group Code Consultant
Kessler McGuinness & Associates, LLC Accessibility Consultant
McPhail Associates, LLC Geotechnical Engineer

Introduction

The Ottoson Middle School is located at 63 Acton Street on a 7.15-acre parcel of land. It is located in a residential neighborhood, adjacent to Town-owned woods (Cusher Lot) and St. Athanasius Greek Orthodox Church. The school is accessed from both Acton Street and Appleton Place. The building was originally constructed in 1921 and expanded in 1996 and is approximately 154,380 square feet in total. The school currently accommodates just over 1,100 students in grades six through eight. The building is constructed into the hillside, with the main entry and parking lot off of Acton Street and a second parking lot and play field accessed from Appleton Place. There is a 52-foot grade change from one side of the property to the other. There are four occupied floor levels (one of which is double-story), the upper parking accommodates 51 cars (3 of which are accessible spaces) and the lower parking lot accommodates 25 cars for a total of 76 parking spaces on site.

The middle school is currently crowded and its student population is projected to increase. The intent of this study is to define an educational program for an addition to Ottoson, develop addition floor plan diagrams, review the existing building condition and identify code and program-related renovation scope of the existing school. This report includes floor plan diagrams and scope narratives used together by a cost estimator to develop a study-level cost estimate.

Educational Program

The proposed addition accommodates the core academic spaces for the sixth grade population (a maximum of 500 students). The proposed space program and layout was developed with the School Administration and for this study purpose includes four academic pods, specialist spaces, break out areas, and support spaces. Refer to **Appendix A** for the Addition Space Program and **Appendix B** for the Addition Floor Plan diagrams.

Addition Architectural Scope

Two addition options were initially developed, one located on the upper parking lot (off Acton Street) and the other on the sports field near Appleton Place. In both, the addition proposed is approximately 40,000 square feet, mostly on two floors with a partial lower floor level for vertical circulation and mechanical space. In both instances the lowest academic floor level is located a floor (or more) above grade to allow for, in the case of the upper lot, parking and the bus drop-off loop to be maintained, and in the case of the Appleton Place location, to align the addition with an occupied floor of the existing school to create the required physical connection. In the instance of the Appleton Place Addition, the raised building would allow for a multipurpose, alternative PE space and increased parking (17 additional spaces) underneath in lieu of the sports field currently in this location.

After thoughtful review by the School Building Task Force it was deemed best to focus the study on one option, the one located on the Appleton Place side of the building. The reasons cited to eliminate the upper parking lot location option from consideration were:
-it encroaches on the upper ballfield, which is not school property
-it needs to be two-plus stories high above the ground to accommodate buses and to meet an existing floor level
-it would require demolishing and rebuilding an existing stair to allow for an accessible connection
-it would create a long and convoluted walking route for a student to reach the three main shared use spaces (Gym, Library, and Cafeteria) in the existing building

Addition Floor Plan diagrams are located in **Appendix B** along with a Building Section diagram showing the top floor of the addition connecting to the lowest level of the existing school at two locations to either side of the Blue Gym. The addition needs to be constructed a minimum of 30'-0" away from the existing building, which places the addition near the property line.

The proposed addition requires lowering the grade by approximately 4'-0" so it is in line with Appleton Street, increasing the need for retaining walls between the existing building and the new addition. The existing parking lot is to be regraded to align with the new, and it is likely that either a low retaining wall along the existing parking lot area or full regrading of the sloped earth is required. Refer to **Appendix C** for the Structural Narrative. All other scope for the addition is presumed (and estimated) to be in line with new construction practices and similar to the recently constructed school in Town.

Renovation Architectural Scope

Educational Program-Related:
In order to accommodate the anticipated increased enrollment, the shared use program spaces within the existing Ottoson building were assessed to determine if they are large enough and/or that there are enough program spaces available for teaching and learning to occur for the nearly 1,500 projected students. Working with the School Administration, it is determined that the following spaces need to be enlarged:

-Cafeteria – remove the wall between the Cafeteria and the adjacent Music Classroom to enlarge the Cafeteria by 1,250 square feet, increasing the total Cafeteria (not including the entry and serving line area) to approximately 5,700 square feet. At this size, four (4) lunch periods are required to serve the student population. Note: existing deteriorating handrails are to be replaced.

-Library – removal of some if not all of the interior partitions to either side of the library, thereby extending not only the circulation but the whole Library space from corridor to corridor to create a Library of approximately 8,500 square feet. (For reference, MSBA (Massachusetts School Building Authority) Guidelines would recommend a 9,000-square foot Library for this size student population). Revisions to the lighting and power/data layouts, and new carpeting are required.

In this Study the addition is assumed to be for the sixth grade population and the seventh and eighth grades are to remain in the existing school. Each grade requires four academic pods, each made up of three general Classrooms and one Science Classroom. The following shared use program spaces are required:
-3 Music Classrooms
-3 Art Classrooms
-3 Technology Classrooms
-3 Family & Consumer Science Classrooms
-7 World Language Classrooms
-2 Computer Classrooms

There are many other specialist and support spaces that may stay in their current location and others that relocate to newly vacated spaces. These spaces include: teacher workrooms, offices, specialist spaces, conference rooms, transition rooms, METCO, LABBB, in-house suspension, administration, guidance, and nurse.

Renovation scope required to create the following program spaces:
-1 Music Classroom: remove walls, revise lighting layout
-1 Art Classroom: add sinks and casework
-2 Science Classrooms: add sinks, casework, fume hood, eyewash/shower station, and utility connections
-2 Computer Classrooms: add power/data connections

Refer to **Appendix D** for floor plan Renovation Diagrams identifying a proposed program layout and reconfiguration for Ottoson.

As proposed, the addition with an accessible entry, toilet facilities, and circulation, is considered a separate building from the existing school and therefore no access-related renovations are required in the existing school.

Other:
The operable walls in the Blue Gymnasium do not function properly. Having functioning operable walls allow for simultaneous use of the Gym and therefore supports scheduling and multi-purpose activities. The renovation estimate includes two new operable walls at the Blue Gym.

Conclusion

A feasibility study level estimate developed from the information and scope provided in this report is included in **Appendix E**. The construction cost equals $19.0 million, applying a 20% factor for soft costs (design, investigation, testing, etc.), the estimated total project cost is $22.8 million.

Appendix A

Space Program

Addition Space Program

Room Type	SF	# of Rms	Area	Notes
General Classroom	850	12	10,200	
Science Classroom	1,300	4	5,200	
Break out	540	4	2,160	
ELL	850	1	850	
Specialist Room	1,060	2	2,120	
Specialist Room	850	1	850	
Specialist Room/Small Group	190	4	760	
Multipurpose Room/ Alt PE	2,000	1	2,000	
Administration/Nurse	850	1	850	
Guidance/Social Worker	850	1	850	
Teacher Workroom	190	2	380	
Building Storage	100	4	400	
TOTAL NET SQUARE FEET			26,620	
Net-to-Gross Factor			1.49	
TOTAL GROSS SQUARE FEET			39,580	

Appendix B

Floor Plan Diagrams &
Building Section

OTTOSON SCHOOL
PARKING LEVEL

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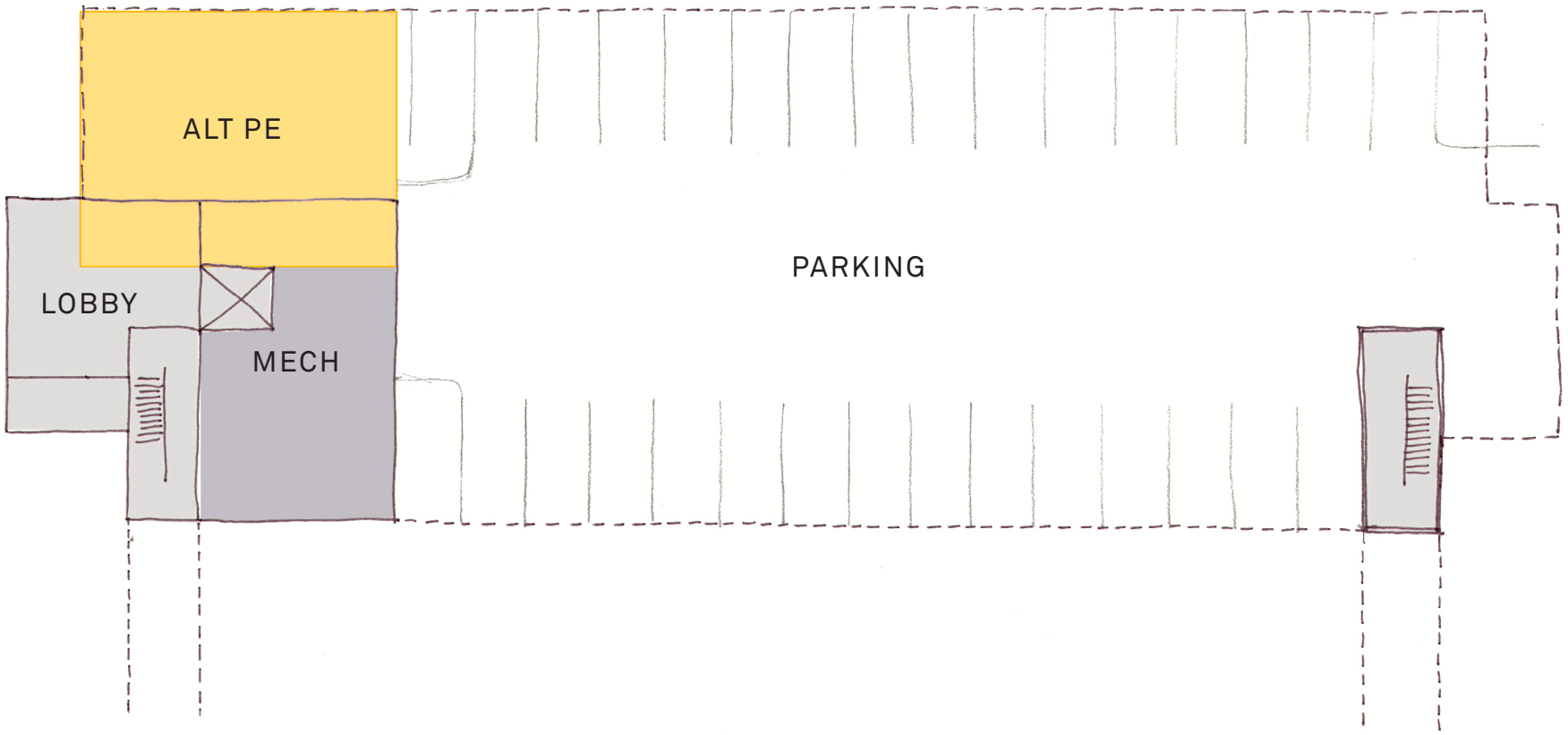
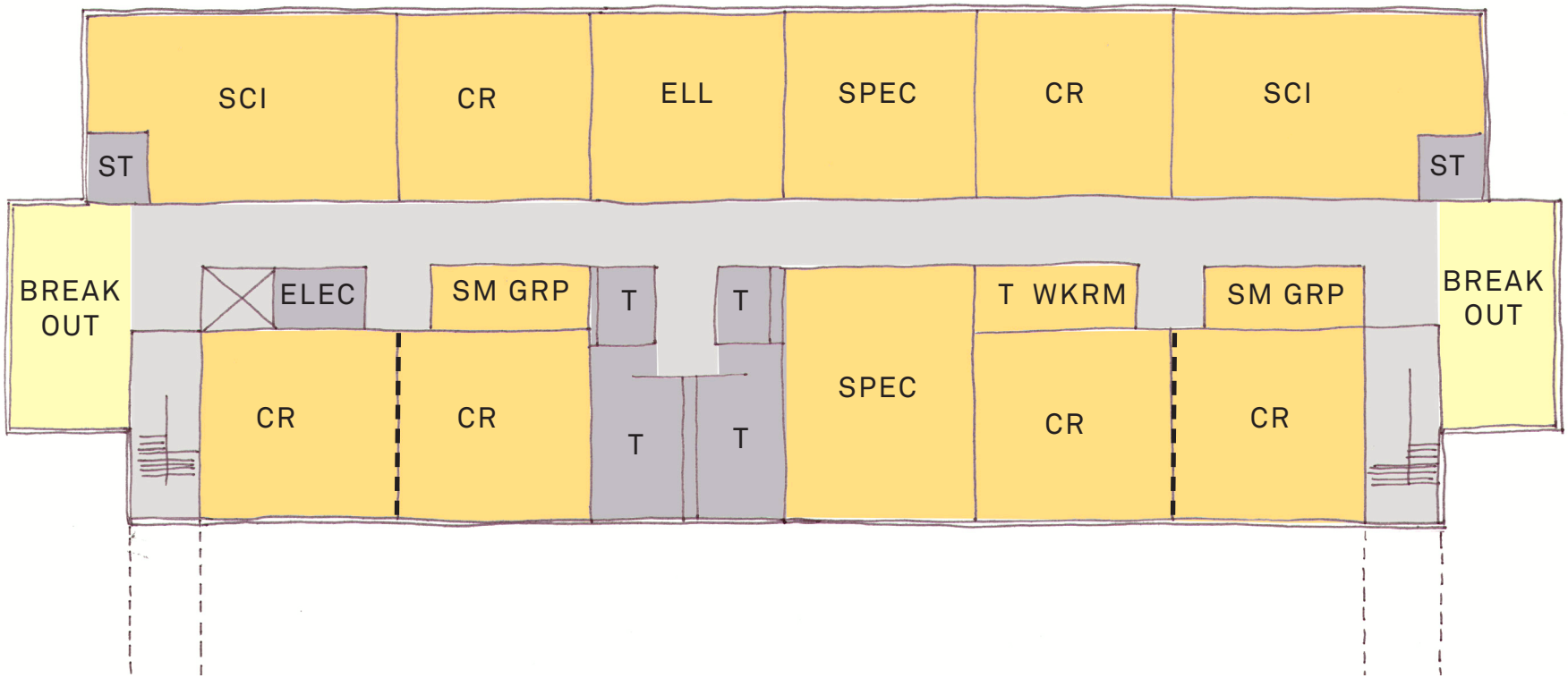


OTTOSON SCHOOL
FIRST FLOOR

N

HMFH



OTTOSON SCHOOL
SECOND FLOOR

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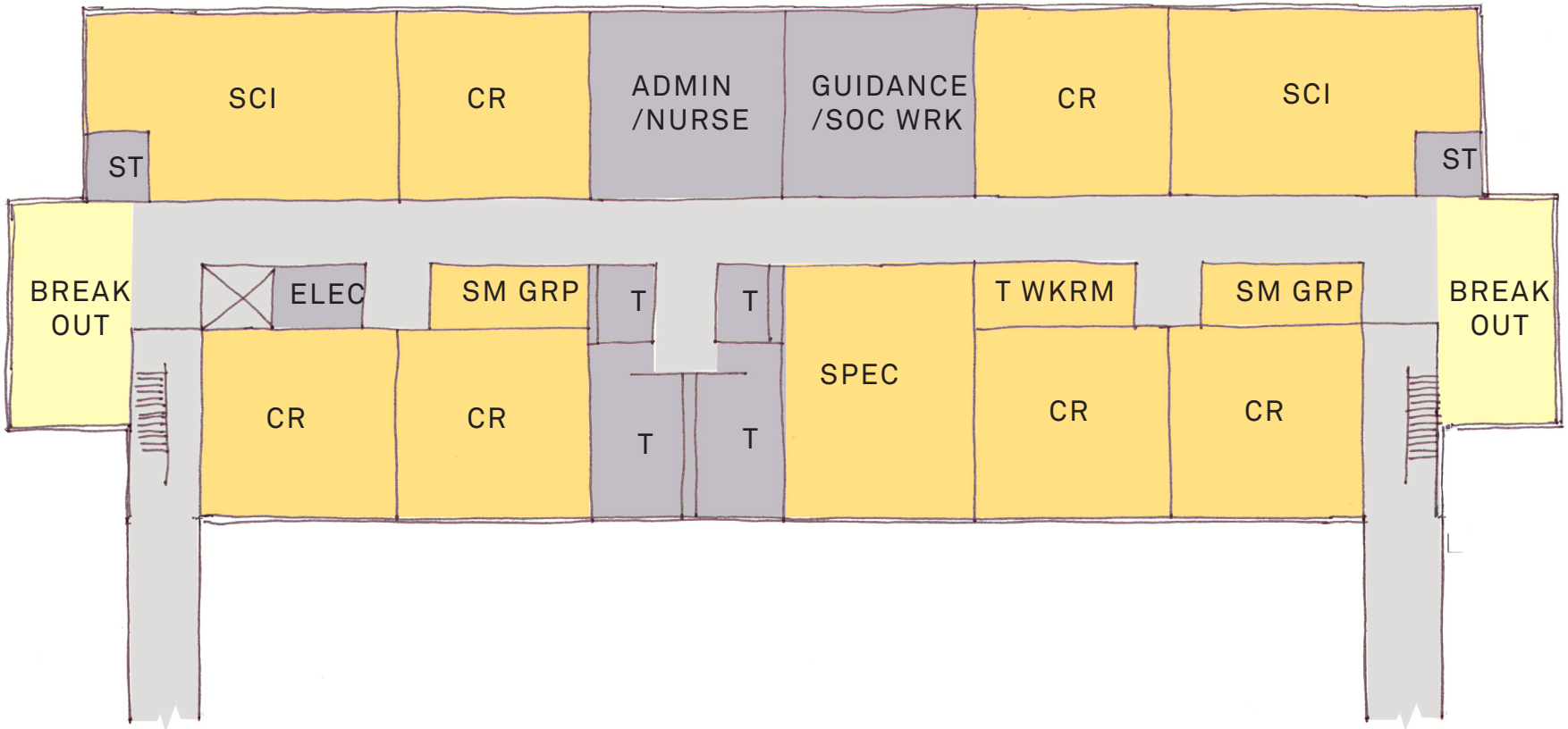
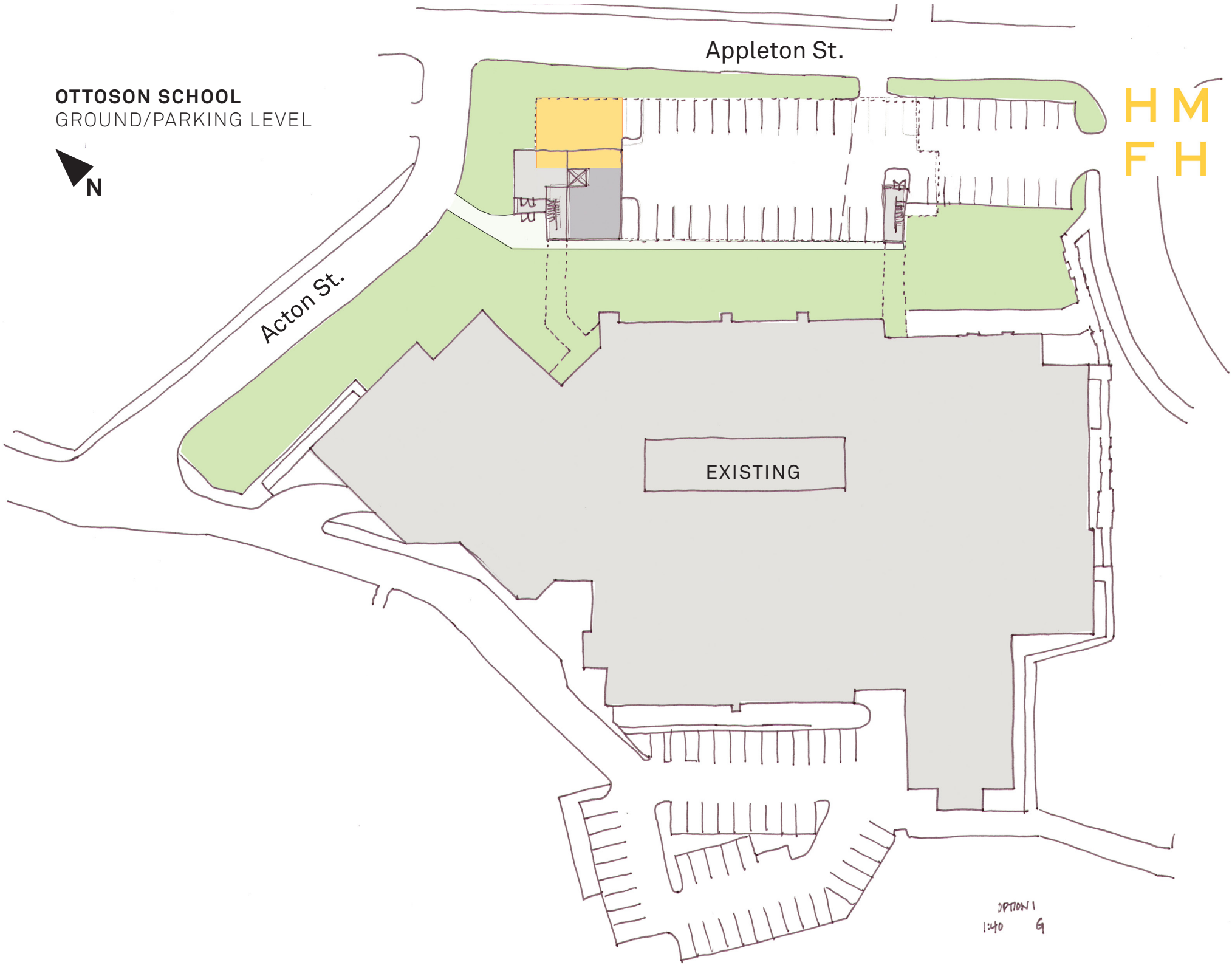


OTTOSON SCHOOL
GROUND/PARKING LEVEL



OTTOSON SCHOOL
FIRST FLOOR

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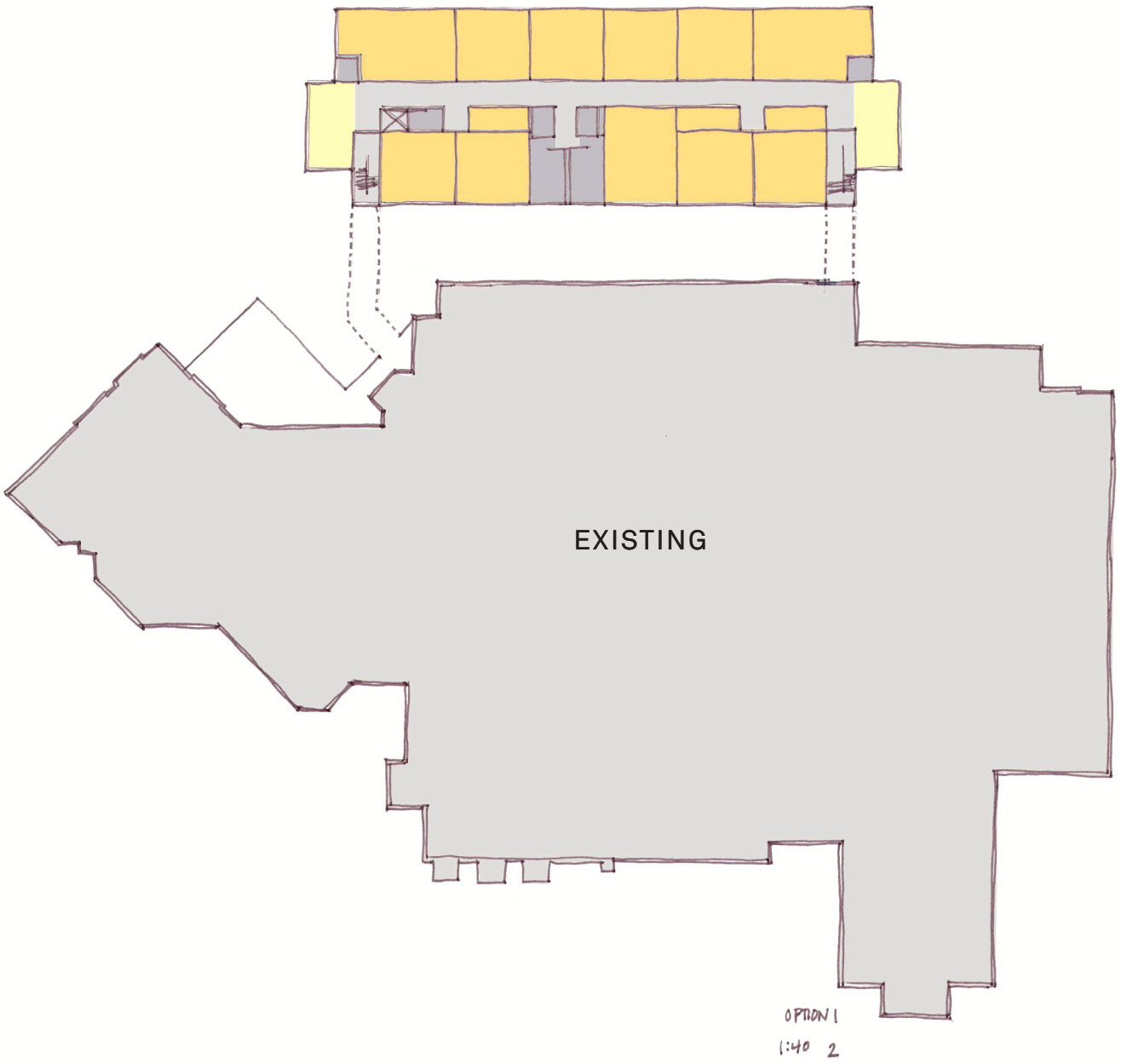

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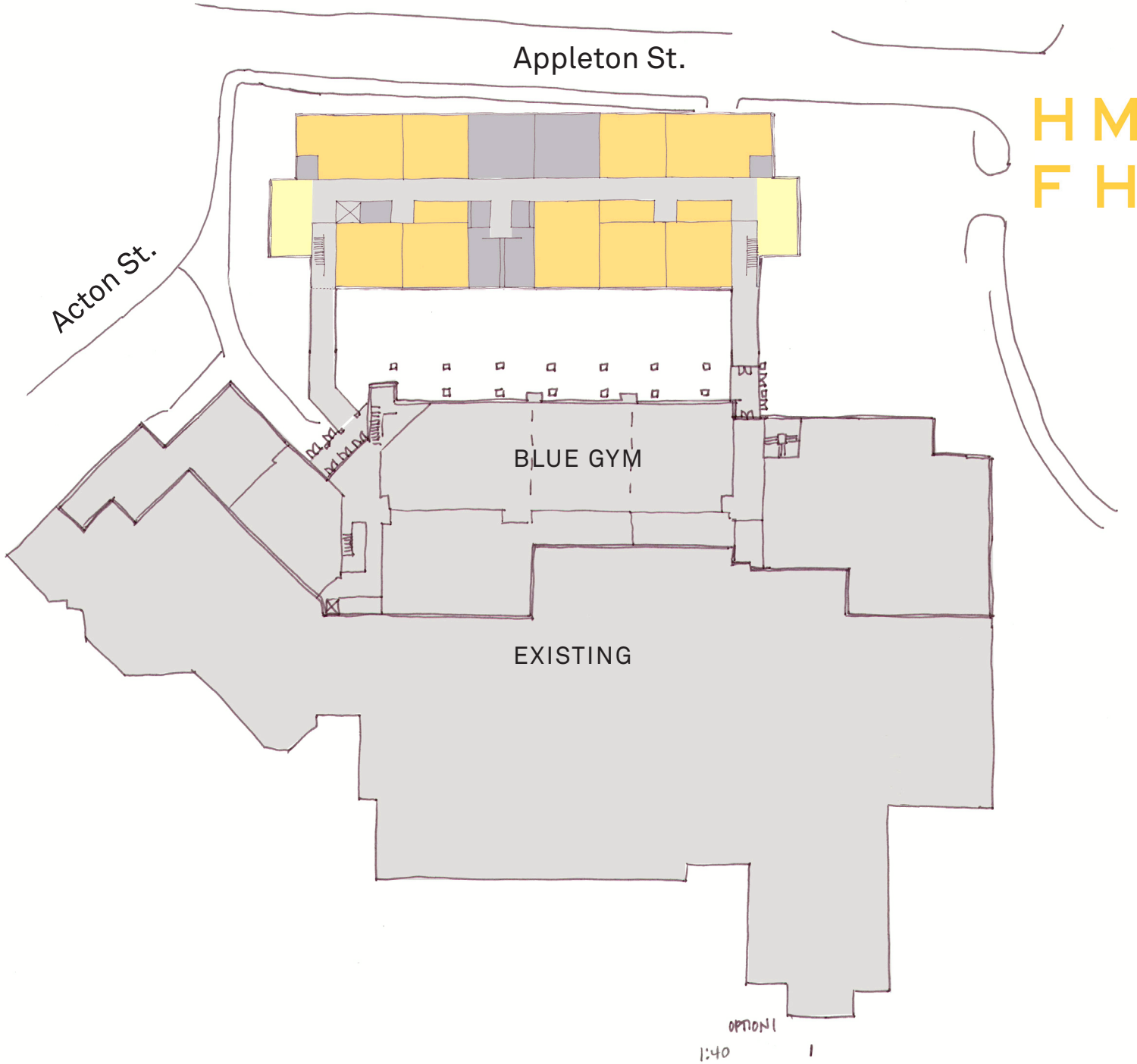
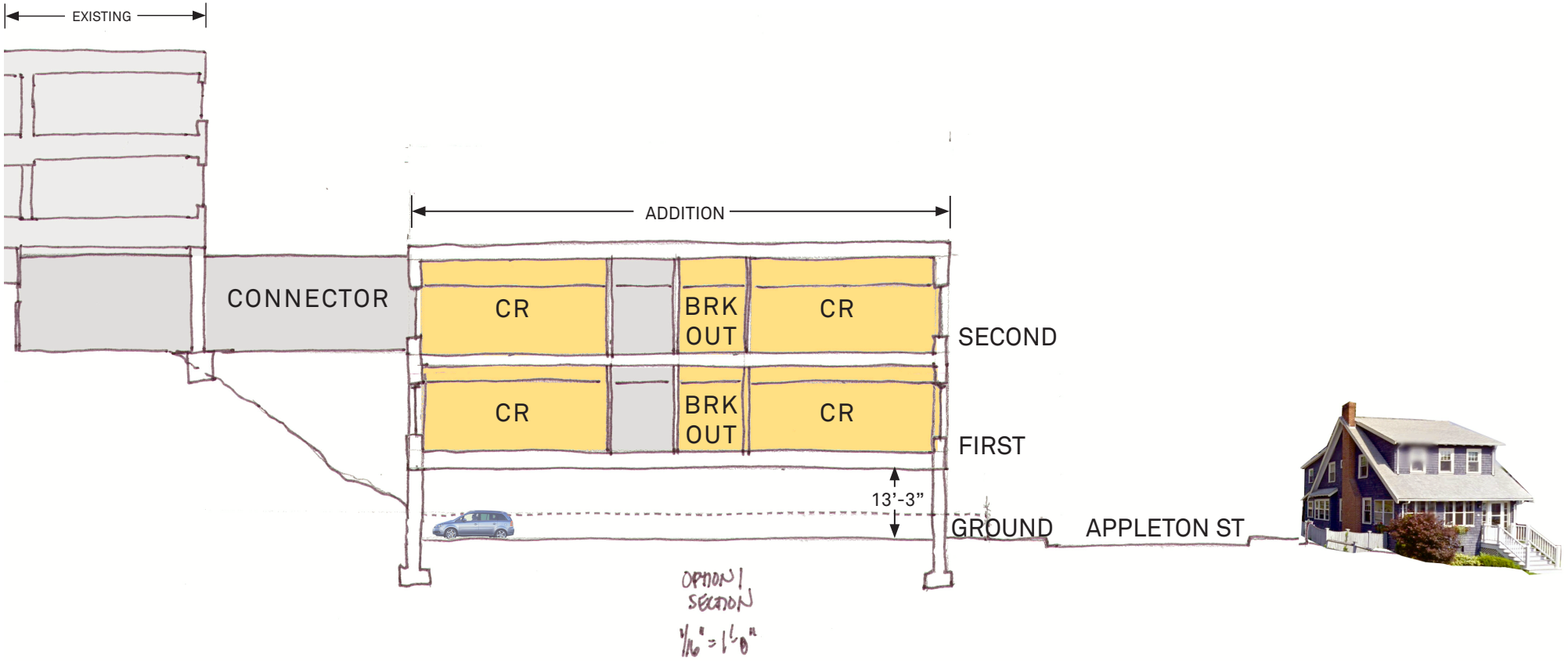
SECOND FLOOR



OTTOSON SCHOOL
SECTION

HMFH



Appendix C

Addition Study –
Structural Narrative

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OTTOSON MIDDLE SCHOOL ADDITION STUDY
Arlington, Massachusetts

Structural Narrative
April 7, 2016

INTRODUCTION

Foley Buhl Roberts & Associates, Inc. (FBRA) is collaborating with *HMFH Architects, Inc. (HMFH)* and their consultants in the study of a potential addition to the Ottoson Middle School in Arlington, MA. The purpose of this narrative is to summarize the basis of the structural design, describe the primary structural systems of the potential, new addition and provide preliminary structural quantities for cost estimating purposes. Outline Structural Specification sections have also been included. The new addition would be designed and constructed under the provisions of the Massachusetts State Building Code (780 CMR – Eighth Edition).

I. GENERAL DESCRIPTION

The Ottoson Middle School, located at 63 Acton Street in Arlington, is a three-story building, constructed on a sloping site (downwards southwest to northeast). The potential, two-story (plus a Parking Level), flat roof addition would be constructed on the northeast (back) side of the existing building on a level playing field area located on Appleton Place.

Program elements for the addition would include a surface Parking Level (Elevation 146.25'+/-), serviced by two stairways and an elevator. An Entry Lobby and a small Mechanical Room would also be located at this level. Classrooms with Breakout Areas would be located at the First Floor (Elevation 150.25'+/-); Classrooms, Breakout Areas and Admin/Nurse/Guidance Offices would be located at the Second Floor (Elevation 174.25'+/-). The total floor area of the addition is approximately 40,000 square feet (gross; excluding parking areas), with a building footprint of approximately 17,600 square feet. Two, one-story, elevated walkway/bridges will be constructed at the east and west ends of the addition (stair locations), linking the Second Floor of the addition to the lowest level of the existing building (Elevation 174.25'+/-).

The addition would be steel framed, for reasons of economy, performance, flexibility, and speed of construction. Typical floor construction would be a concrete slab on composite steel deck, supported by composite, structural wide flange steel beams and girders. Shear studs would be field welded to the beam/girder flanges to achieve composite action with the floor slab. Typical flat roof areas would be framed with steel roof deck supported by structural steel beams and girders. A concrete slab on composite steel floor deck would be provided at rooftop equipment areas (for acoustic purposes).

Typical columns would be rectangular hollow steel tube (HSS) sections. Lateral stability for wind and seismic loads would be provided by steel bracing in each direction at each level (including the Parking Level as well). Structural bays would be approximately 30 feet square.

The new, steel framed construction would be classified as Type IIB (Noncombustible, Unprotected); floor and roof construction would not require fire protection. Typical, non-exposed floor and roof steel framing would be surface prepped and be left unprimed. Structural steel exposed to view in the finished work (limited areas; potentially the Entry Lobby) would be classified as Exposed to View Structural Steel (E.V.S.S.) and would be shop primed with primer compatible with the finish paint.

No subsurface soils information was available; however, based on recent discussions with the Geotechnical Engineer (McPhail Associates, LLC) rock is present at the site. Foundations for the 1996 addition (adjacent to the potential new addition) consist of caissons bearing on rock at Elevation 140.0'+/-. It is expected that the top of rock elevation slopes downwards towards Appleton Place and will not impact the foundation construction of the addition. Accordingly, foundations are expected to be conventional, shallow spread footing construction; typically bearing on undisturbed natural soils overlying the rock. The current grade at the addition site is Elevation 150.0'+/-, which is approximately 4 feet above Appleton Place. The existing fill in this area will need to be removed to accommodate the Parking Level and the building foundations, which will be located at Elevation 42.0'+/-. Parking Level construction will be a bituminous concrete slab. A conventional concrete slab on grade, underlain by a polyethylene vapor barrier and rigid insulation on a compacted slab base fill, will be constructed in the occupied areas at this Level (Entry Lobby, Mechanical Room, Stairwells, etc.). Existing utilities, if present within the addition footprint, will be removed and relocated to accommodate the new construction.

Exterior wall construction will be a mixture of glazing and steel stud cavity wall construction with a masonry veneer. Galvanized steel loose lintels will be provided at the heads of typical, punched window openings in the masonry veneer. Galvanized relieving angles will be required at larger and/or multiple, minimally separated window openings, and at locations where the height of masonry exceeds 30 feet.

II. BASIS OF STRUCTURAL DESIGN

Codes and Design Standards

Building Code: Massachusetts State Building Code (780 CMR) – 8th Edition.

Materials: ASTM; applicable standards

Concrete: ACI 318 and ACI 301; latest editions.

Structural Steel: AISC "Specification for Structural Steel Buildings" and AISC "Code of Standard Practice"; latest editions.

Steel Deck: Steel Deck Institute (SDI) – Referenced Standards.

Design Loads/Parameters

Live Loads:

Classrooms (with partition allowance):	70 PSF
Corridors (Second Floor):	80 PSF
Open Plan Areas:	100 PSF
Stairs:	100 PSF
Mechanical Areas:	150 PSF

Snow Loads (Arlington):

Basic Ground Snow Load:	40 PSF
Minimum Flat Roof Snow Load:	30 PSF

Future Photovoltaic Panel (PV) Loads:

Flat Roof:	10 PSF

Wind Loads (Arlington):

Wind Speed:	105 MPH

Seismic Parameters (Arlington):

Spectral Response – Short Periods:	S_S = 0.290g
Spectral Response – 1-Second Periods:	S_D = 0.069g
Seismic Use Group:	III
Seismic Design Category:	B
Site Class:	C (Assumed)
Structural System:	Building Frame System
Lateral Load Resisting System:	Steel Braced Frames (*Not Specifically Detailed for Seismic Resistance*)
Response Modification Factor (R):	3.0
System Overstrength Factor (Ω_0):	3.0
Deflection Amplification Factor (C_d):	3.0

Foundations:

The preliminary foundation design is based on an assumed allowable bearing capacity of 4.0 kips per square foot (2.0 tons per square foot) on undisturbed natural soils or on compacted structural fill (to be confirmed). All fill and unsuitable soils (fill, organics and loose silts, if present) will be removed and replaced with compacted structural fill, prior to constructing the foundations and the slab on grade.

Construction Classification:

New construction will be Type IIB Construction (Noncombustible, Unprotected). Floor and roof construction will typically not require applied fireproofing, except those members supporting rated enclosures. The addition will be fully sprinklered.

Sustainable Design Considerations:

Sustainable design considerations will be incorporated in the building design; the new addition will be designed and constructed in accordance with LEED (Silver) standards.

III. STRUCTURAL SYSTEMS DESCRIPTION

A. SUBSTRUCTURE

A10: Foundations

Foundations for the addition will consist of individual spread footings (at columns) and continuous strip footings (at walls). All foundation walls and footings will be cast-in-place, reinforced concrete. The preliminary foundation design is based on 4.0 kips per square foot (2.0 TSF) on undisturbed natural soils or on structural fill.

Prior to placing footings or compacted structural fill, all unsuitable soils will be removed and the natural soil layer will be proof-rolled. Any soft/unsuitable areas will be removed and replaced by compacted structural fill. If subgrades become wet, unstable, and/or difficult to proof-roll, a layer of crushed stone, underlain by a geotextile separation fabric, may be necessary. Following footing excavation, provide a 4" thick layer of ¾" crushed stone to protect the subgrade.

Due to the existing site topography, a reinforced concrete retaining wall will be required along the south (back) side of the addition, returning around the corners on the east and west ends. The existing (stepped) retaining walls to the north of the 1996 addition will be removed and a temporary lateral earth retention system (e.g. soldier piles and lagging) will be installed to facilitate the construction of the foundations. Landscaping between the addition and the existing building will need to be restored after construction is completed.

Temporary dewatering may be required during construction.

It is not expected that rock will be encountered during foundation or utility excavation.

A perimeter foundation drain will be required along the south (back) wall of the addition. Underslab drainage will be installed below the occupied areas of the Parking Level.

A1010 – Standard Foundations

- Typical perimeter frost wall: *14" thick with an 8" wide masonry shelf with horizontal and vertical reinforcing each face (4.5+/- psf). The outside surface of the perimeter foundation walls will receive a troweled-on bituminous mastic.*

- Typical perimeter frost wall continuous footing: *2'-0" wide, by 12" deep, with continuous reinforcing bars, plus dowels to the foundation wall (10.0+/- plf). The bottom of footing will be placed 4'-0" minimum below the exterior finish grade for frost protection.*

- Cantilever retaining walls (along the south/back side of the addition): *16" thick, with horizontal and vertical reinforcing each face (9.5 +/- psf). The outside surface of the cantilever foundation walls will receive a troweled-on bituminous mastic.*

- Cantilever retaining wall continuous footing: *8'-6" wide, by 1'-6" deep, with 9.5 psf reinforcing. The bottom of the footing will be approximately 4'-0" below the Parking Level bituminous concrete slab on grade.*

- Typical, average interior column footing: *10'- 0" x 10'- 0" x 2'- 4" deep, with 1000 pounds of reinforcing. The bottom of the footing will be approximately 4'-0" below the Parking Level bituminous concrete slab on grade.*

- Typical, average perimeter column footing: *8'- 0" x 8'- 0" x 2'- 0" deep, with 560 pounds of reinforcing. The bottom of the footing will be approximately 4'-0" below the Parking Level bituminous concrete slab on grade.*

- Typical piers/pilasters at interior/perimeter columns: *22 inches square, reinforced concrete with 45 plf reinforcing.*

- Typical grade beams interconnecting footings in bracing bays: *2'-0" wide by 2'-0" deep with 50 plf reinforcing (assume 240 linear feet required).*

- Foundation Wall Dampproofing: *ASTM D1227 Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing; Type II, Class I, non-asbestos fibers.*

- Anchor Bolts: Anchor bolts at column base plates shall conform to ASTM F1554 – Grade 36 and shall be headed type. Provide a minimum of four (4), ¾" diameter anchor bolts at all columns; additional bolts and/or larger diameter bolts will be required at bracing locations.

A1020 – Special Foundations

- Elevator pit: Elevator pit construction will consist of 12" thick, reinforced concrete walls and an 18" thick, reinforced concrete foundation mat, with an integral sump pit. Waterstops will be provided at all construction joints and all interior surfaces of the elevator pit will be waterproofed. Elevator shaft walls will be 100% solid grouted, reinforced CMU construction (8" thick).

A1030 – Slabs on Grade

Parking Level floor construction in occupied/enclosed areas will typically be a 5" thick concrete slab on grade, reinforced with welded wire fabric. The slab will be underlain by a heavy duty (16-mil) vapor barrier, rigid insulation, and 6" of compacted slab base fill. Saw cut control joints (1¼" deep) will be provided in each direction at each column line. Full depth isolation joints will be constructed around columns. The Mechanical Room will be similar construction, with a 6" thick concrete slab on grade. A bituminous concrete slab on grade will be provided at parking areas.

- Welded wire fabric for concrete slabs on grade: *6x6-W2.9xW2.9*

B. SHELL

B10: Superstructure

Structural Bays/Spans: The typical structural bay will be approximately 30'-0" x 30'-0".

Story Heights: Story heights will be approximately 14'-0; the Second Floor of the addition will match the lowest level floor level of the existing building (Elevation 174.25'+/-).

Steel Framing Connections: Type 2 simple framing connections (shear only); double clip angles typically.

Columns: Typical columns will be rectangular steel tube (HSS) sections.

Lateral Force Resisting System: Lateral (wind and seismic) forces will be resisted by steel bracing, for reasons of economy, stiffness, reduced structural depth and smaller column sizes. Bracing members will be square or rectangular HSS sections. Brace configurations may include chevrons, inverted chevrons ("V"), or single diagonals in short bays, as required by architectural considerations.

Expansion (Seismic) Joints: There will be no internal expansion joints in the addition; however, expansion joints will be required at the interface of the two links/bridges and the existing building.

Fire Protection: As previously noted, addition will be classified at Type IIB Construction (Noncombustible, Unprotected). The addition will be fully sprinklered. Typical floor and roof construction will not require fire protection, except those members supporting rated enclosures. All steel framed construction is considered to be *restrained*.

B1010 – Floor Construction

First and Second Floor Construction: Composite structural steel framing: 3½" thick (minimum), normal weight concrete topping slab with welded wire fabric on 2" deep, 18 gauge, composite type, galvanized steel floor deck (5½" minimum total slab thickness), supported by composite wide flange steel beams, spaced at 7+/- feet to 8+/- feet o.c. Steel beams are supported by composite wide flange steel girders. Steel girders span to HSS (tubular) steel columns. Slabs on steel deck will be placed at the required elevation, adding concrete to compensate for the deflection of the (unshored) steel framing (approximately ¾" average additional concrete in each structural bay). In all areas, composite action between the steel beams/girders and the concrete slab on steel deck will be achieved by field welding ¾" diameter, 4" long headed shear connectors to the top flanges. Floor finishing will be coordinated with flooring requirements.

- Welded wire fabric for slabs on steel form deck and slabs on composite steel deck: *6x6-W2.9xW2.9.*

- The estimated weight of structural steel at the First and Second Floors of the addition including beams, columns, bracing, plates, relieving angles, miscellaneous frames, connections, etc. is as follows:

Structural Steel Weight: 13.5 psf

- Shear Studs: Assume 25, ¾" diameter, 4" long headed shear studs per 100 square feet of composite steel framed floor area.

B1020 – Roof Construction

Typical Roof Construction: Typical roof construction consists of a 1½" deep, 18 gauge, Type WR galvanized steel roof deck spanning to wide flange steel beams. Steel beams are typically supported by wide flange steel girders, which span to HSS (tube) steel columns.

Rooftop Mechanical Equipment Areas: Concrete slabs on composite steel deck will be provided below rooftop mechanical units, for acoustical purposes (similar to floor construction, described above).

Drainage: Roof drainage will be achieved by tapered insulation, or by pitching structural steel where practical.

- The estimated weight of structural steel at the Roof Level of the addition (including beams, columns, bracing, girts, plates, angles, relieving angles, miscellaneous frames and connections; but excluding entry canopies, loose lintels, etc.) is as follows:

Structural Steel Weight: 13.0 psf

B20: Exterior Enclosure

B2010 – Exterior Walls

Exterior wall construction will be a mixture of masonry veneer/steel stud cavity wall construction, along with areas of glazed curtainwall and architectural panels. Galvanized steel loose lintels will be provided at the heads of typical, punched window openings. Continuous galvanized relieving angles will be provided at larger and/or multiple, minimally separated window openings, and at locations where the height of masonry exceeds 30 feet.

The steel stud backup will be 16 gauge minimum studs, designed for an H/600 deflection limitation. Vertical slip joints will be provided in the metal stud backup system at each level. Ties to the masonry veneer will be installed at 16" o.c. horizontally and vertically.

IV. OUTLINE SPECIFICATION

Concrete:

- All concrete shall be normal weight, 4,000 psi at 28 days, except foundation walls and footings, which shall be normal weight, 3,000 psi and exterior (exposed) concrete (paving) which shall be normal weight, 4,500 psi.
- Portland Cement: ASTM C150, Type I or II.
- Fly Ash: ASTM C618, Class F. Replacement of cement content with fly ash is limited to 20% (by weight). Fly ash is not permitted in exterior, exposed concrete, slabs on grade or slabs on steel deck.
- All concrete shall be proportioned with 3/4" maximum aggregate, ASTM C 33, except 3/8" maximum aggregate shall be used at toppings less than 2" thick (e.g. metal pan stairs).
- All reinforcing shall be ASTM A 615 deformed bars, Grade 60.
- All welded wire fabric shall conform to ASTM A 185.
- Reinforcing bars, steel wire, welded wire fabric, and miscellaneous steel accessories shall contain a minimum of 25% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with Submittal Requirements.
- Concrete products manufactured within 500 miles (by air) of the project site shall be documented in accordance with Submittal Requirements.
- Cure all concrete by moisture retention methods, approved by Architect; curing compounds shall not be used.

Reinforced Concrete Masonry (Elevator Shaft):

- Masonry construction shall conform to ACI 530/ASCE 5/TMS 402 "Building Code Requirements for Masonry Structures", latest edition.
- Masonry strength, f'm shall not be less than 1350 psi.
- Requirements for load bearing block strength shall be as required for specified masonry strength (f'm) but shall not be less than 2000 psi on the net area of the block.
- Grout shall conform to ASTM C476, Type Fine, and shall be of strength required for specified masonry strength (F'm) but not less than 3000 psi.
- Mortar for reinforced masonry shall conform to ASTM C 270 Type S and shall be of strength required for specified masonry strength (f'm) but not less than 1800 psi.
- Reinforcing bars shall conform to ASTM A 615 Grade 60 deformed bars. Lap all continuous bars 48 diameters and provide bar positioners. Assume No. 5 bars at 2'-8" o.c. vertically and horizontal bond beams with 2 – No. 5 continuous at 4'-0" o.c.
- Joint reinforcing shall be 9 gauge ladder type conforming to ASTM A 82. Provide prefabricated corners and tees. Walls shall be reinforced horizontally with joint reinforcing at 16 inches on centers unless otherwise noted.
- Reinforcing bars, steel wire and miscellaneous accessories shall contain a minimum of 25% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with Submittal Requirements.
- Elevator shaft walls shall be 100% solid grouted (all cores); low lift grouting.
- Masonry products manufactured within 500 miles (by air) of the project site shall be documented in accordance with Submittal Requirements.

Structural Steel:

- Structural steel shapes shall conform to ASTM A 992, Fy = 50 ksi.
- Steel tubes (HSS) shall conform to ASTM A 500, Grade B/C, Fy=50 ksi.
- Structural steel plates and bars shall conform to ASTM A 36, Fy = 36 ksi.
- Steel members shall contain a minimum of 25% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with the Submittal Requirements.
- Steel manufactured within 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements.
- Anchor Bolts: Anchor bolts at column base plates shall conform to ASTM F1554 – Grade 36 and shall be headed type. Provide a minimum of four (4), ¾" diameter anchor

bolts at all columns; additional bolts and/or larger diameter will be required at bracing locations.

- Bolted connections shall be ASTM A 325, Type N (bearing) bolts, except slip-critical bolts shall be used at lateral brace beam connections.
- Shear connectors shall be ¾" diameter, 4" long, headed Nelson studs conforming to ASTM A 108.
- Shop and field welding shall be AWS D1.1 E70XX electrodes.
- Surface treatment for typical structural steel: SSPC Surface Preparation No. 3 (Power Tool Cleaning). Structural steel shall be left unprimed.
- Surface treatment for Exposed to View Structural Steel (E.V.S.S.) in the Gymnasium and the Cafetorium shall be SSPC Surface Preparation No. 6 (Commercial Blast Cleaning). Structural steel shall receive one coat of shop primer that is compatible with the finish paint.
- All exterior, exposed structural steel shall be hot-dipped galvanized.

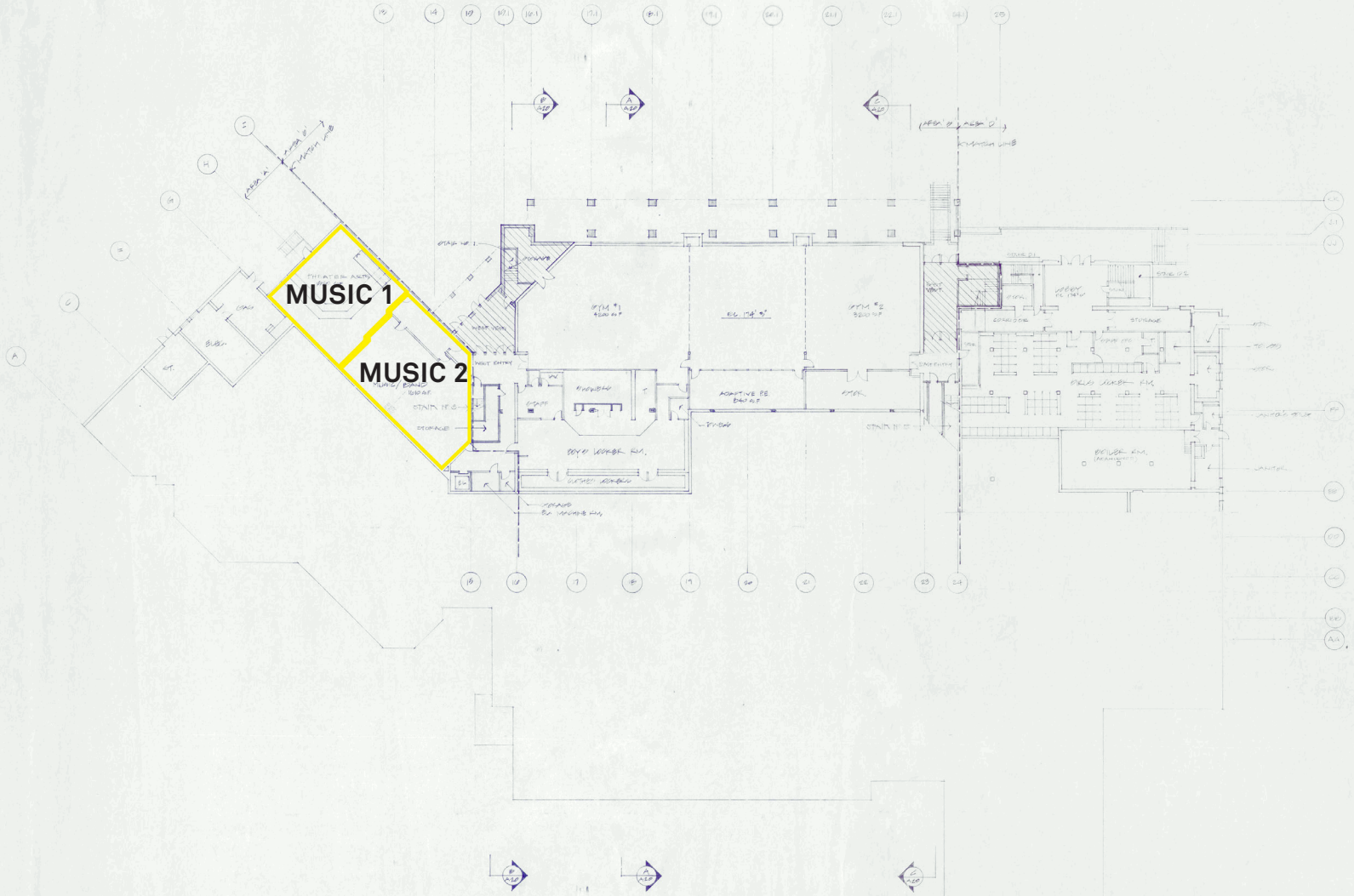
Steel Deck:

- Typical steel roof deck shall be 1½" deep, 18 gauge, Type WR, conforming to ASTM A653, Grade 33 (minimum), galvanized in accordance with ASTM A 653, coating class G-60.
- Typical steel floor deck shall be 2" deep, 18 Gauge, composite type, conforming to ASTM A 653, Grade 33, galvanized in accordance with ASTM A 653, coating class G-60.
- All steel floor deck and roof deck accessories (pour stops, finish strips, closures, etc.) shall be the same finish as the deck; 18 gauge minimum.
- Steel deck shall contain a minimum of 25% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with the Submittal Requirements.
- Steel deck manufactured within 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements.
- Provide 14 gauge sump pans at roof drains.

End of Structural Narrative

Appendix D

Renovation Diagrams



SHARED

CORE

SPEC/SUPT

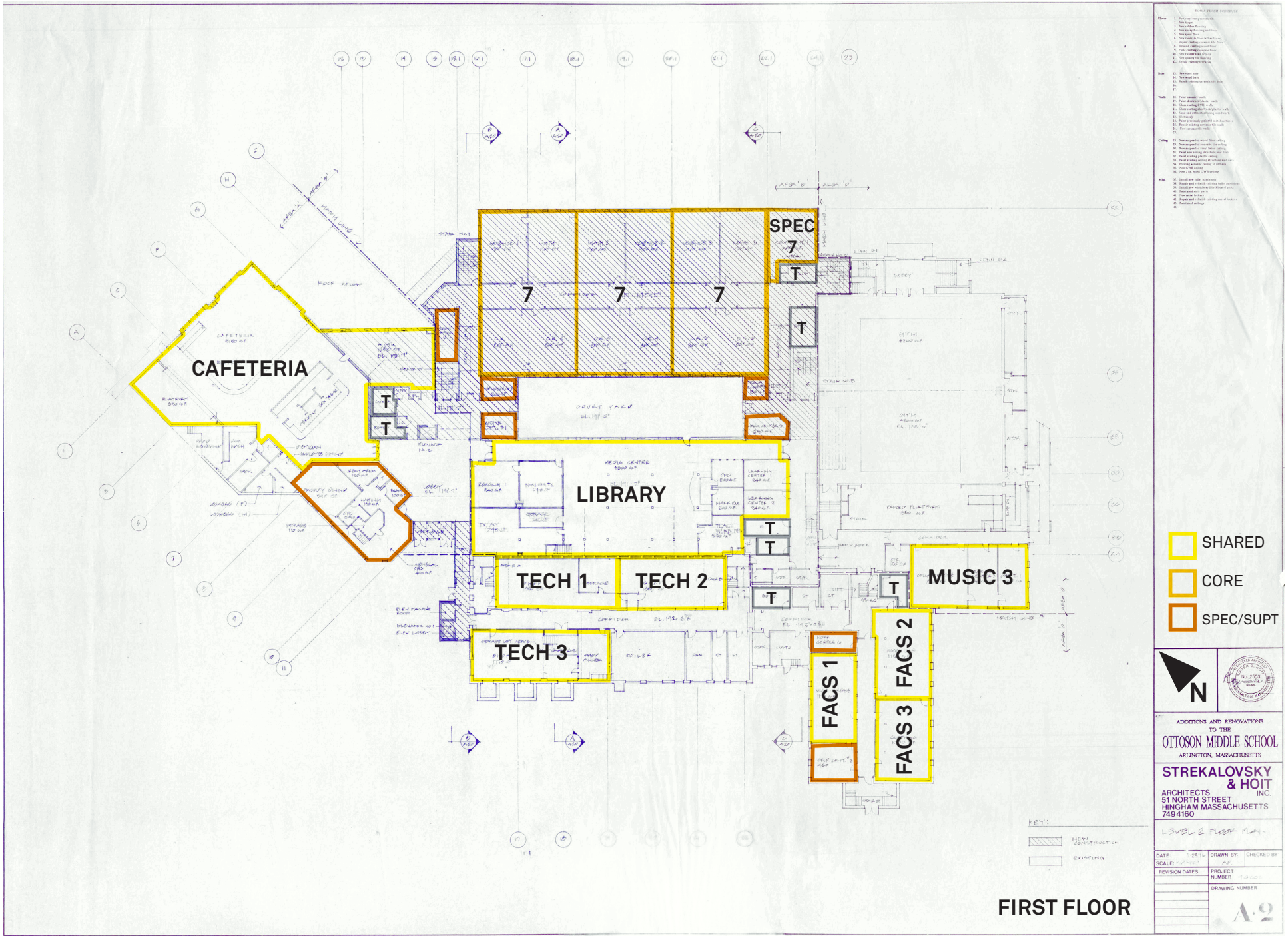
N

ADDITIONS AND RENOVATIONS
TO THE
OTTOSON MIDDLE SCHOOL
ARLINGTON, MASSACHUSETTS

STREKALOVSKY & HOIT ARCHITECTS INC.
51 NORTH STREET
HINGHAM MASSACHUSETTS
749 4160

DATE: 5.27.16 | DRAWN BY: | CHECKED BY:
SCALE:
REVISION DATES | PROJECT NUMBER
DRAWING NUMBER: A-1

LOWER LEVEL

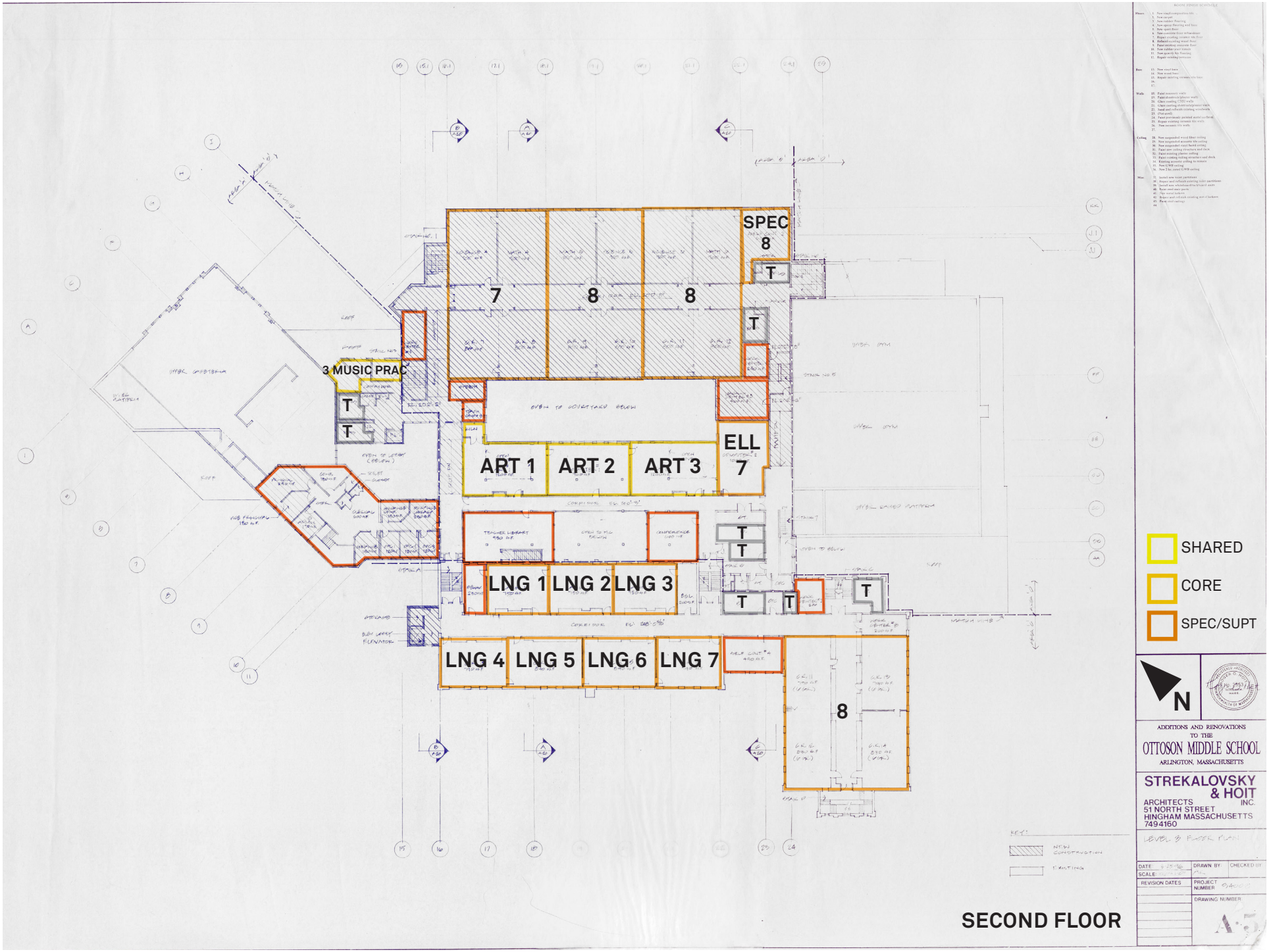


ADDITIONS AND RENOVATIONS TO THE
OTTOSON MIDDLE SCHOOL
ARLINGTON, MASSACHUSETTS

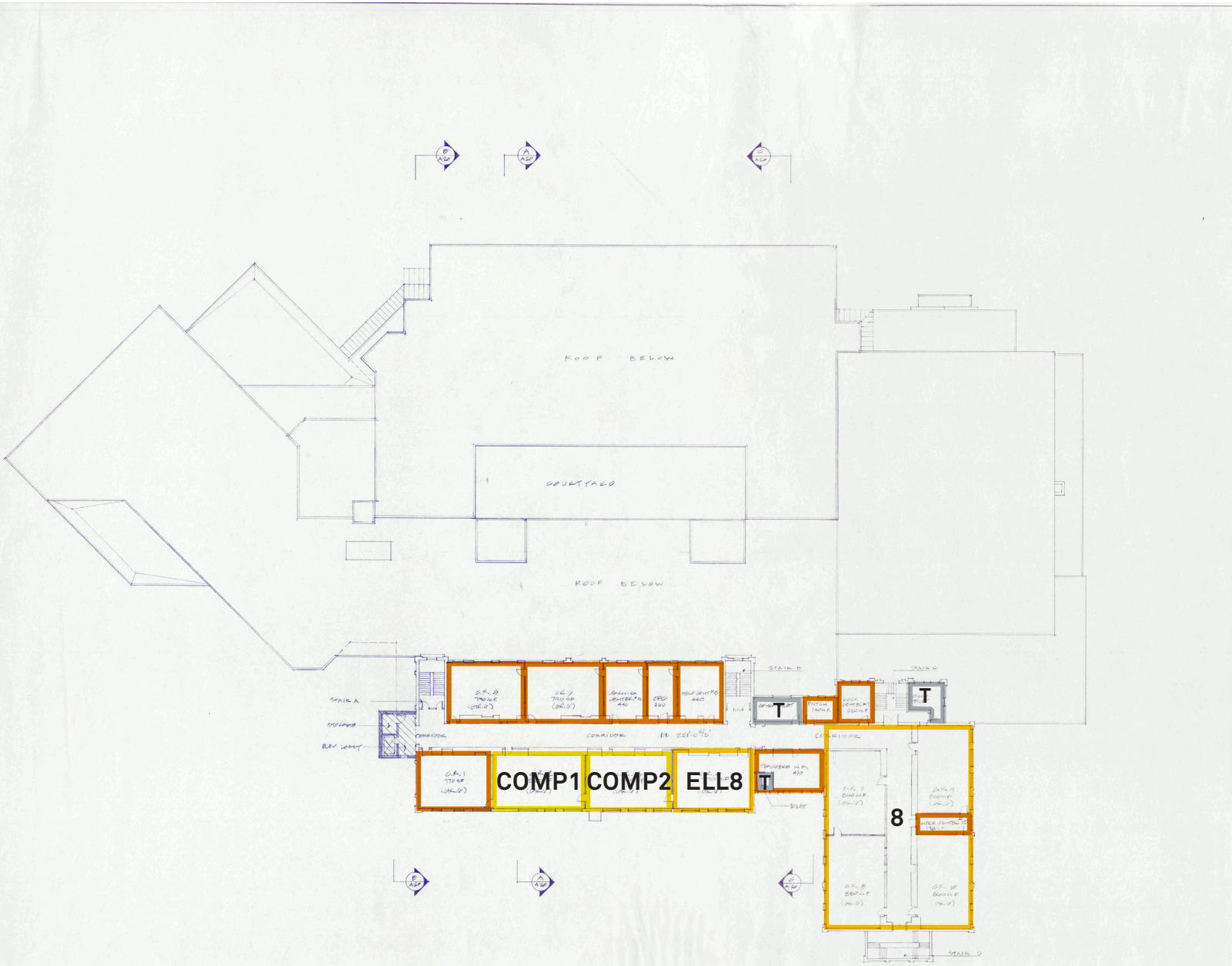
STREKALOVSKY & HOIT INC.
ARCHITECTS
51 NORTH STREET
HINGHAM MASSACHUSETTS
7494160

LEVEL 2 FLOOR PLAN

DATE: 3-25-14 | DRAWN BY: AR | CHECKED BY:
SCALE: 1/8"=1'-0"
REVISION DATES | PROJECT NUMBER: 1314.01
DRAWING NUMBER: A-2



SECOND FLOOR



SHARED

CORE

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N

ADDITIONS AND RENOVATIONS TO THE
OTTOSON MIDDLE SCHOOL
ARLINGTON, MASSACHUSETTS

STREKALOVSKY & HOIT INC.
ARCHITECTS
51 NORTH STREET
HINGHAM MASSACHUSETTS
7494160

LEVEL 4 PLAN

DATE: 5.25.16 | DRAWN BY: | CHECKED BY:
SCALE: 1/8" = 1'-0"
REVISION DATES
PROJECT NUMBER 34006
DRAWING NUMBER: A-4

THIRD FLOOR

Appendix E

Feasibility Study
Design Estimate

Feasibility Design Estimate

Ottoson Middle School
RENOVATIONS + ADDITION

Arlington, MA

PM&C LLC
20 Downer Avenue, Suite 1c
Hingham, MA 02043
(T) 781-740-8007
(F) 781-740-1012

Prepared for:

HMFH Architects, Inc

April 25, 2016

PM&C

Ottoson Middle School
RENOVATIONS + ADDITION
Arlington, MA

25-Apr-16

Feasibility Design Estimate

MAIN CONSTRUCTION COST SUMMARY

	Construction Start	Gross Floor Area	$/sf	Estimated Construction Cost
RENOVATION + ADDITION				
RENOVATE EXISTING SCHOOL		154,380	$9.46	$1,460,681
ADDITION		39,580	$294.31	$11,648,810
SITEWORK				$646,659
SUB-TOTAL	Apr-17	193,960	$70.92	$13,756,150
ESCALATION TO START - (assumed 4% PA)	4.0%			$550,246
DESIGN AND PRICING CONTINGENCY	12%			$1,650,738
SUB-TOTAL		193,960	$82.27	$15,957,134
GENERAL CONDITIONS				$1,276,571
GENERAL REQUIREMENTS	3.00%			$478,714
BONDS	1.00%			$159,571
INSURANCE	1.25%			$199,464
PERMIT				NIC
OVERHEAD AND FEE	3.00%			$478,714
GMP CONTINGENCY				$478,714
TOTAL OF ALL CONSTRUCTION	Apr-17	193,960	$98.11	**$19,028,882**

ALTERNATES

ADDED MULTIPURPOSE ROOM TO NEW ADDITION	ADD	**$609,225**
ALTERNATE HVAC -1		
Add DX partial cooling for New Addition classrooms	ADD	**$191,171**
ALTERNATE HVAC -2		
Add displacement ventilation with partial cooling and dehumidification to new addition	ADD	**$245,792**

PMC - Project Management Cost

PM&C

Ottoson Middle School
RENOVATIONS + ADDITION
Arlington, MA

25-Apr-16

Feasibility Design Estimate

This Feasibility Design cost estimate was produced from drawings, narratives, outline specifications and other documentation prepared by HMFH Architects Inc. and their design team dated April 6, 2016. Design and engineering changes occurring subsequent to the issue of these documents have not been incorporated in this estimate.

This estimate includes all direct construction costs, construction manager's overhead, fee and design contingency. Cost escalation assumes start dates indicated.

Bidding conditions are expected to be public bidding under Chapter 149a of the Massachusetts General Laws to pre-qualified construction managers, and pre-qualified sub-contractors, open specifications for materials and manufactures.

The estimate is based on prevailing wage rates for construction in this market and represents a reasonable opinion of cost. It is not a prediction of the successful bid from a contractor as bids will vary due to fluctuating market conditions, errors and omissions, proprietary specifications, lack or surplus of bidders, perception of risk, etc. Consequently the estimate is expected to fall within the range of bids from a number of competitive contractors or subcontractors, however we do not warrant that bids or negotiated prices will not vary from the final construction cost estimate.

ITEMS NOT CONSIDERED IN THIS ESTIMATE

Items not included in this estimate are:

- Land acquisition, feasibility, and financing costs
- All professional fees and insurance
- Site or existing conditions surveys investigations costs, including to determine subsoil conditions
- All Furnishings, Fixtures and Equipment
- Items identified in the design as Not In Contract (NIC)
- Items identified in the design as by others
- Owner supplied and/or installed items as indicated in the estimate
- Utility company back charges, including work required off-site
- Work to City streets and sidewalks, (except as noted in this estimate)
- Construction contingency

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Ottoson Middle School
RENOVATIONS + ADDITION
Arlington, MA

25-Apr-16

Feasibility Design Estimate

GFA 154,380

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
RENOVATION TO EXISTING BUILDING						
A10	**FOUNDATIONS**					
	A1010	Standard Foundations	$0			
	A1020	Special Foundations	$0			
	A1030	Lowest Floor Construction	$15,260	**$15,260**	$0.10	1.0%
B10	**SUPERSTRUCTURE**					
	B1010	Upper Floor Construction	$5,000			
	B1020	Roof Construction	$0	**$5,000**	$0.03	0.3%
B20	**EXTERIOR CLOSURE**					
	B2010	Exterior Walls	$0			
	B2020	Windows/Curtainwall	$0			
	B2030	Exterior Doors	$0	**$0**	$0.00	0.0%
B30	**ROOFING**					
	B3010	Roof Coverings	$0			
	B3020	Roof Openings	$0	**$0**	$0.00	0.0%
C10	**INTERIOR CONSTRUCTION**					
	C1010	Partitions	$218,400			
	C1020	Interior Doors	$0			
	C1030	Specialties/Millwork	$25,438	**$243,838**	$1.58	16.7%
C20	**STAIRCASES**					
	C2010	Stair Construction	$2,400			
	C2020	Stair Finishes	$0	**$2,400**	$0.02	0.2%
C30	**INTERIOR FINISHES**					
	C3010	Wall Finishes	$302,850			
	C3020	Floor Finishes	$170,050			
	C3030	Ceiling Finishes	$96,293	**$569,193**	$3.69	39.0%
D10	**CONVEYING SYSTEMS**					
	D1010	Elevator	$0	**$0**	$0.00	0.0%
D20	**PLUMBING**					
	D20	Plumbing	$78,000	**$78,000**	$0.51	5.3%
D30	**HVAC**					
	D30	HVAC	$167,500	**$167,500**	$1.08	11.5%
D40	**FIRE PROTECTION**					
	D40	Fire Protection	$0	**$0**	$0.00	0.0%
D50	**ELECTRICAL**					
	D5010	Electrical Systems	$121,600	**$121,600**	$0.79	8.3%
E10	**EQUIPMENT**					

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Ottoson Middle School
RENOVATIONS + ADDITION
Arlington, MA

25-Apr-16

Feasibility Design Estimate

GFA 154,380

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
RENOVATION TO EXISTING BUILDING						
	E10	Equipment	$52,000	**$52,000**	$0.34	3.6%
E20	**FURNISHINGS**					
	E2010	Fixed Furnishings	$110,560			
	E2020	Movable Furnishings	NIC	**$110,560**	$0.72	7.6%
F10	**SPECIAL CONSTRUCTION**					
	F10	Special Construction	$0	**$0**	$0.00	0.0%
F20	**SELECTIVE BUILDING DEMOLITION**					
	F2010	Building Elements Demolition	$95,330			
	F2020	Hazardous Components Abatement	$0	**$95,330**	$0.62	6.5%
TOTAL DIRECT COST (Trade Costs)				***$1,460,681***	*$9.46*	*100.0%*

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Ottoson Middle School 25-Apr-16
RENOVATIONS + ADDITION
Arlington, MA

Feasibility Design Estimate **GFA** 154,380

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	RENOVATION TO EXISTING BUILDING						
	TOTAL GROSS FLOOR AREA (GFA)				**154,380** ***GSF***		
	A10 FOUNDATIONS						
A1010	**STANDARD FOUNDATIONS**						
	No work in this section						
	SUBTOTAL					-	
A1020	**SPECIAL FOUNDATIONS**						
	No work in this section						
	SUBTOTAL						
A1030	**LOWEST FLOOR CONSTRUCTION**						
	Cutting and patching for new plumbing	**763**	sf	20.00	15,260		
	SUBTOTAL					15,260	
	TOTAL - FOUNDATIONS						**$15,260**
	B10 SUPERSTRUCTURE						
B1010	**FLOOR CONSTRUCTION**						
	Fire stopping floors	**1**	ls	5,000.00	5,000		
	SUBTOTAL					5,000	
B1020	**ROOF CONSTRUCTION**						
	No work in this section						
	SUBTOTAL					-	
	TOTAL - SUPERSTRUCTURE						**$5,000**
	B20 EXTERIOR CLOSURE						
B2010	**EXTERIOR WALLS**						
	No work assumed to existing exterior						
	SUBTOTAL					-	
B2020	**WINDOWS/CURTAINWALL**						
	No work assumed to existing exterior						
	SUBTOTAL					-	
B2030	**EXTERIOR DOORS**						
	No work assumed to existing exterior						
	SUBTOTAL					-	
	TOTAL - EXTERIOR CLOSURE						
	B30 ROOFING						
B3010	**ROOF COVERINGS**						
	No work assumed to existing exterior						
	SUBTOTAL					-	
B3020	**ROOF OPENINGS**						
	No work in this section						
	SUBTOTAL					-	
	TOTAL - ROOFING						

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Ottoson Middle School 25-Apr-16
RENOVATIONS + ADDITION
Arlington, MA

Feasibility Design Estimate **GFA** 154,380

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	RENOVATION TO EXISTING BUILDING						
	C10 INTERIOR CONSTRUCTION						
	C1010 PARTITIONS						
	Operable partitions at blue gym	**2,912**	sf	75.00	218,400		
	SUBTOTAL					218,400	
	C1020 INTERIOR DOORS						
	No work in this section						
	SUBTOTAL					-	
	C1030 SPECIALTIES / MILLWORK						
	Room Signs	**1**	ls	10,000.00	10,000		
	Miscellaneous sealants throughout building	**154,380**	sf	0.10	15,438		
	SUBTOTAL					25,438	
	TOTAL - INTERIOR CONSTRUCTION						**$243,838**
	C20 STAIRCASES						
	C2010 STAIR CONSTRUCTION						
	New handrails at cafeteria	**8**	loc	300.00	2,400		
	SUBTOTAL					2,400	
	C2020 STAIR FINISHES						
	No work in this section						
	SUBTOTAL					-	
	TOTAL - STAIRCASES						**$2,400**
	C30 INTERIOR FINISHES						
	C3010 WALL FINISHES						
	Paint to walls etc.	**154,380**	gfa	1.50	231,570		
	Ceramic tile, full height	**3,240**	sf	22.00	71,280		
	SUBTOTAL					302,850	
	C3020 FLOOR FINISHES						
	Carpet to library	**8,500**	sf	4.33	36,805		
	LFT at music classroom and science classrooms	**3,600**	sf	4.00	14,400		
	Ceramic tile to toilets	**763**	sf	20.00	15,260		
	Patch existing floors at removed walls	**310**	lf	30.00	9,300		
	Rubber base	**25,730**	lf	2.50	64,325		
	Ceramic tile base	**360**	lf	16.00	5,760		
	Floor prep	**12,100**	sf	2.00	24,200		
	SUBTOTAL					170,050	
	C3030 CEILING FINISHES						
	ACT, 2x2	**12,100**	sf	5.00	60,500		
	GWB ceiling	**763**	sf	10.00	7,630		
	Patch existing ceilings at removed walls	**310**	lf	40.00	12,400		
	Paint GWB	**763**	sf	1.00	763		
	Soffits	**1**	ls	15,000.00	15,000		
	SUBTOTAL					96,293	
	TOTAL - INTERIOR FINISHES						**$569,193**

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Ottoson Middle School 25-Apr-16
RENOVATIONS + ADDITION
Arlington, MA

Feasibility Design Estimate **GFA** 154,380

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	RENOVATION TO EXISTING BUILDING						
	D10 CONVEYING SYSTEMS						
	No work in this section						
	SUBTOTAL					-	
	TOTAL - CONVEYING SYSTEMS						
	D20 PLUMBING						
	D20 PLUMBING, GENERALLY						
	New sinks at science/art rooms	**14**	fxt	5,000.00	70,000		
	Eye wash station	**2**	loc	4,000.00	8,000		
	SUBTOTAL					78,000	
	TOTAL - PLUMBING						**$78,000**
	D30 HVAC						
	D30 HVAC, GENERALLY						
	HVAC modifications at library modifications	**8,500**	sf	15.00	127,500		
	HVAC modifications at music room modifications	**1,200**	sf	15.00	18,000		
	Exhaust modifications at bathrooms	**11**	loc	2,000.00	22,000		
	SUBTOTAL					167,500	
	TOTAL - HVAC						**$167,500**
	D40 FIRE PROTECTION						
	D40 FIRE PROTECTION, GENERALLY						
	New sprinkler system - assumed not required				ETR		
	SUBTOTAL					-	
	TOTAL - FIRE PROTECTION						
	D50 ELECTRICAL						
	D5010 COMPLETE ELECTRICAL SYSTEMS						
	Lighting, power and Tele/Data at library modifications	**8,500**	sf	12.00	102,000		
	Power/Data at computer classrooms	**2**	rms	5,000.00	10,000		
	Lighting at music room modifications	**1,200**	sf	8.00	9,600		
	SUBTOTAL					121,600	
	TOTAL - ELECTRICAL						**$121,600**
	E10 EQUIPMENT						
	E10 EQUIPMENT, GENERALLY						
	New fume hoods	**2**	ea	11,000.00	22,000		
	Replace gym bleachers	**1**	ls	30,000.00	30,000		
	SUBTOTAL					52,000	
	TOTAL - EQUIPMENT						**$52,000**
	E20 FURNISHINGS						

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Ottoson Middle School 25-Apr-16
RENOVATIONS + ADDITION
Arlington, MA

Feasibility Design Estimate **GFA** 154,380

	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
	RENOVATION TO EXISTING BUILDING						
	E2010 FIXED FURNISHINGS						
	Science Classrooms	*2*	*rms*				
	Base cabinets and Epoxy counters	**112**	lf	450.00	50,400		
	Wall cabinets	**112**	lf	300.00	33,600		
	Tall storage	**4**	ea	1,400.00	5,600		
	FACS/Art	*2*	*rms*				
	Base cabinets and plam counters	**32**	lf	300.00	9,600		
	Wall cabinets	**32**	lf	180.00	5,760		
	Tall storage	**4**	ea	1,400.00	5,600		
	SUBTOTAL					110,560	
	E2020 MOVABLE FURNISHINGS						
	All movable furnishings to be provided and installed by owner						
	SUBTOTAL					NIC	
	TOTAL - FURNISHINGS						**$110,560**
	F10 SPECIAL CONSTRUCTION						
	F10 SPECIAL CONSTRUCTION						
	No items in this section						
	SUBTOTAL						
	TOTAL - SPECIAL CONSTRUCTION						
	F20 SELECTIVE BUILDING DEMOLITION						
	F2010 BUILDING ELEMENTS DEMOLITION						
	Remove existing GWB walls	**4,340**	sf	2.00	8,680		
	Demolish existing floor slab	**763**	sf	12.00	9,156		
	Remove floor finishes	**12,863**	sf	2.00	25,726		
	Remove ceilings	**13,173**	sf	1.00	13,173		
	Miscellaneous demo/protection	**154,380**	gfa	0.25	38,595		
	SUBTOTAL					95,330	
	F2020 HAZARDOUS COMPONENTS ABATEMENT						
	None Included						
	SUBTOTAL						
	TOTAL - SELECTIVE BUILDING DEMOLITION						**$95,330**

PM&C

Ottoson Middle School 25-Apr-16
RENOVATIONS + ADDITION
Arlington, MA

Feasibility Design Estimate GFA 39,580

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
ADDITION						
A10	**FOUNDATIONS**					
	A1010	Standard Foundations	$503,120			
	A1020	Special Foundations	$0			
	A1030	Lowest Floor Construction	$66,562	**$569,682**	$14.39	4.9%
A20	**BASEMENT CONSTRUCTION**					
	A2010	Basement Excavation	$0			
	A2020	Basement Walls	$0	**$0**	$0.00	0.0%
B10	**SUPERSTRUCTURE**					
	B1010	Upper Floor Construction	$1,361,452			
	B1020	Roof Construction	$701,882	**$2,063,334**	$52.13	17.7%
B20	**EXTERIOR CLOSURE**					
	B2010	Exterior Walls	$1,013,860			
	B2020	Windows	$941,857			
	B2030	Exterior Doors	$30,121	**$1,985,838**	$50.17	17.0%
B30	**ROOFING**					
	B3010	Roof Coverings	$511,568			
	B3020	Roof Openings	$2,500	**$514,068**	$12.99	4.4%
C10	**INTERIOR CONSTRUCTION**					
	C1010	Partitions	$863,042			
	C1020	Interior Doors	$197,900			
	C1030	Specialties/Millwork	$262,572	**$1,323,514**	$33.44	11.4%
C20	**STAIRCASES**					
	C2010	Stair Construction	$128,000			
	C2020	Stair Finishes	$29,320	**$157,320**	$3.97	1.4%
C30	**INTERIOR FINISHES**					
	C3010	Wall Finishes	$237,480			
	C3020	Floor Finishes	$316,640			
	C3030	Ceiling Finishes	$398,180	**$952,300**	$24.06	8.2%
D10	**CONVEYING SYSTEMS**					
	D1010	Elevator	$120,000	**$120,000**	$3.03	1.0%
D20	**PLUMBING**					
	D20	Plumbing	$554,120	**$554,120**	$14.00	4.8%

PM&C

Ottoson Middle School 25-Apr-16
RENOVATIONS + ADDITION
Arlington, MA

Feasibility Design Estimate GFA 39,580

CONSTRUCTION COST SUMMARY

	BUILDING SYSTEM		*SUB-TOTAL*	*TOTAL*	*$/SF*	*%*
ADDITION						
D30	**HVAC**					
	D30	HVAC	$1,424,880	**$1,424,880**	$36.00	12.2%
D40	**FIRE PROTECTION**					
	D40	Fire Protection	$253,810	**$253,810**	$6.41	2.2%
D50	**ELECTRICAL**					
	D5010	Complete System	$1,369,080	**$1,369,080**	$34.59	11.8%
E10	**EQUIPMENT**					
	E10	Equipment	$0	**$0**	$0.00	0.0%
E20	**FURNISHINGS**					
	E2010	Fixed Furnishings	$340,864			
	E2020	Movable Furnishings	NIC	**$340,864**	$8.61	2.9%
F10	**SPECIAL CONSTRUCTION**					
	F10	Special Construction	$0	**$0**	$0.00	0.0%
F20	**HAZMAT REMOVALS**					
	F2010	Building Elements Demolition	$20,000			
	F2020	Hazardous Components Abatement	$0	**$20,000**	$0.51	0.2%
TOTAL DIRECT COST (Trade Costs)				***$11,648,810***	*$294.31*	*100.0%*

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
ADDITION							
	GROSS FLOOR AREA CALCULATION						
	Parking Level			3,100			
	First Floor			18,240			
	Second Floor			18,240			
	TOTAL GROSS FLOOR AREA (GFA)					**39,580** ***sf***	
	A10 FOUNDATIONS						
A1010	**STANDARD FOUNDATIONS**						
	Strip footings - 2'-0" x 1'-0"						
	Excavation	**282**	cy	12.00	3,384		
	Store on site for reuse	**282**	cy	14.00	3,948		
	Backfill with new fill	**262**	cy	16.00	4,192		
	Formwork	**508**	sf	11.00	5,588		
	Re-bar, 10#/lf	**2,540**	lbs	1.20	3,048		
	Concrete material; 3,000 psi	**20**	cy	125.00	2,500		
	Placing concrete	**20**	cy	55.00	1,100		
	Foundation walls at exterior - 14" thick						
	Formwork	**2,032**	sf	12.50	25,400		
	Re-bar, 4.5#/sf	**4,572**	lbs	1.20	5,486		
	Concrete material; 4,000 psi	**46**	cy	135.00	6,210		
	Placing concrete	**46**	cy	65.00	2,990		
	Dampproofing foundation wall and footing	**1,524**	sf	1.90	NIC		
	Insulation to foundation walls; 2" thick	**1,016**	sf	2.50	2,540		
	Form shelf	**254**	lf	8.00	2,032		
	Strip footings at retaining walls - 8'-6" x 1'-6"						
	Excavation	**472**	cy	12.00	5,664		
	Store on site for reuse	**472**	cy	14.00	6,608		
	Backfill with new fill	**371**	cy	16.00	5,936		
	Formwork	**612**	sf	11.00	6,732		
	Re-bar	**16,473**	lbs	1.20	19,768		
	Concrete material; 3,000 psi	**101**	cy	125.00	12,625		
	Placing concrete	**101**	cy	55.00	5,555		
	Retaining walls at exterior - 16" thick						
	Formwork	**5,712**	sf	16.00	91,392		
	Re-bar, 9.5#/sf	**27,132**	lbs	1.20	32,558		
	Concrete material; 4,000 psi	**148**	cy	135.00	19,980		
	Placing concrete	**148**	cy	65.00	9,620		
	Waterproofing foundation wall and footing	**2,448**	sf	8.00	19,584		
	Insulation to foundation walls; 2" thick	**2,448**	sf	2.50	6,120		
	Form shelf	**204**	lf	8.00	1,632		
	Grade Beams						
	Excavation	**267**	cy	12.00	3,204		
	Store on site for reuse	**267**	cy	14.00	3,738		
	Backfill with new fill	**230**	cy	16.00	3,680		
	Formwork	**960**	sf	11.00	10,560		
	Re-bar, 50#/lf	**12,000**	lbs	1.20	14,400		
	Concrete material; 3,000 psi	**37**	cy	125.00	4,625		
	Placing concrete	**37**	cy	55.00	2,035		
	Exterior column footings, typical, 8' x 8' x 2'-0"						
	Excavation	**372**	cy	15.00	5,580		

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
ADDITION							
	Store on site for reuse	**372**	cy	14.00	5,208		
	Backfill with new fill	**262**	cy	16.00	4,192		
	Formwork	**1,408**	sf	11.00	15,488		
	Re-bar	**12,320**	lbs	1.20	14,784		
	Concrete material; 3,000 psi	**110**	cy	125.00	13,750		
	Placing concrete	**110**	cy	55.00	6,050		
	Set anchor bolts grout plates	**22**	ea	150.00	3,300		
	Interior column footings, typical, 10' x 10' x 2'-4"						
	Excavation	**276**	cy	15.00	4,140		
	Store on site for reuse	**276**	cy	14.00	3,864		
	Backfill with new fill	**167**	cy	16.00	2,672		
	Formwork	**1,118**	sf	11.00	12,298		
	Re-bar	**12,000**	lbs	1.20	14,400		
	Concrete material; 3,000 psi	**109**	cy	125.00	13,625		
	Placing concrete	**109**	cy	55.00	5,995		
	Set anchor bolts grout plates	**12**	ea	150.00	1,800		
	Interior pilasters						
	Formwork	**996**	sf	11.00	10,956		
	Re-bar	**6,120**	lbs	1.20	7,344		
	Concrete material; 3,000 psi	**18**	cy	125.00	2,250		
	Placing concrete	**18**	cy	55.00	990		
	SUBTOTAL					503,120	
A1020	**SPECIAL FOUNDATIONS**						
	No Work in this section						
	SUBTOTAL						
A1030	**LOWEST FLOOR CONSTRUCTION**						
	New Slab on grade, 5" thick						
	Structural gravel fill, 8"	**77**	cy	30.00	2,310		
	Base course, 8" gravel	**77**	cy	35.00	2,695		
	Rigid insulation	**3,100**	sf	2.25	6,975		
	Vapor barrier	**3,100**	sf	1.00	3,100		
	Mesh reinforcing 15% lap	**3,565**	sf	0.80	2,852		
	Concrete - 5" thick	**51**	cy	125.00	6,375		
	Placing concrete	**51**	cy	45.00	2,295		
	Finishing and curing concrete	**3,100**	sf	1.50	4,650		
	Control joints - saw cut	**3,100**	sf	0.10	310		
	Miscellaneous						
	New Elevator pits	**1**	ea	30,000.00	30,000		
	Equipment pads - allow	**1**	ls	5,000.00	5,000		
	SUBTOTAL					66,562	
	TOTAL - FOUNDATIONS						**$569,682**
A20	***BASEMENT CONSTRUCTION***						
A2010	**BASEMENT EXCAVATION**						
	No items in this section						
	SUBTOTAL					-	
A2020	**BASEMENT WALLS**						
	No items in this section						
	SUBTOTAL					-	

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Ottoson Middle School
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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
ADDITION							
	TOTAL - BASEMENT CONSTRUCTION						
B10	***SUPERSTRUCTURE***						
		18	lbs/sf				
B1010	**FLOOR CONSTRUCTION**	365	tns				
	Floor Structure - Steel:						
	Steel beams and columns; 13.5/SF; including garage level structure	**246**	tns	3,800.00	934,800		
	Shear studs	**7,296**	ea	2.50	18,240		
	Floor Structure						
	2" Metal floor Deck	**36,480**	sf	3.00	109,440		
	WWF reinforcement	**41,952**	sf	0.80	33,562		
	Concrete Fill to metal deck; 5 1/2" Normal weight	**650**	cy	125.00	81,250		
	Place and finish concrete	**36,480**	sf	2.00	72,960		
	Miscellaneous						
	Exposed steel premium	**1**	ls	10,000.00	10,000		
	Fire proofing to columns and beams	**36,480**	sf	2.50	91,200		
	Fire stopping floors	**2**	flrs	5,000.00	10,000		
	SUBTOTAL					1,361,452	
B1020	**ROOF CONSTRUCTION**						
	Roof Structure - Steel:						
	Steel beams/Joists; 13#/SF	**119**	tns	3,800.00	452,200		
	Roof Structure						
	1-1/2" Metal floor Deck @ roof	**18,240**	sf	3.00	54,720		
	Roof Structure @ Mech Equipment/Low roof						
	WWF reinforcement	**9,315**	sf	0.80	7,452		
	Concrete Fill to metal deck; 5 1/4" Light weight	**129**	cy	170.00	21,930		
	Place and finish concrete	**8,100**	sf	3.00	24,300		
	Miscellaneous						
	Premium for bridge framing	**1**	ls	60,000.00	60,000		
	Roof screen framing - allow	**1,100**	sf	20.00	22,000		
	Fire proofing to columns, beams and deck	**18,240**	sf	3.25	59,280		
	SUBTOTAL					701,882	
	TOTAL - SUPERSTRUCTURE						**$2,063,334**
B20	***EXTERIOR CLOSURE***						
B2010	**EXTERIOR WALLS; 60% solid/40% glass**	*13,768*	sf				
	Interior skin						
	6" metal stud backup	**11,634**	sf	7.50	87,255		
	Batt insulation in stud	**11,634**	sf	2.25	26,177		
	2 1/2" Rigid Insulation	**11,634**	sf	3.00	34,902		
	Air barrier	**11,634**	sf	6.00	69,804		
	Air barrier/flashing at windows	**2,272**	lf	7.00	15,904		
	Gypsum Sheathing	**11,634**	sf	2.75	31,994		
	Drywall lining to interior face of stud backup	**11,634**	sf	3.00	34,902		
	Interior skin @ garage level						
	8" CMU backup	**2,134**	sf	22.00	46,948		
	2 1/2" Rigid Insulation	**2,134**	sf	3.00	6,402		

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
ADDITION							
	Air barrier	**2,134**	sf	6.00	12,804		
	Exterior skin						
	Brick veneer; 75% of exterior wall	**10,326**	sf	35.00	361,410		
	Metal panels; 25% of exterior wall	**3,442**	sf	60.00	206,520		
	Miscellaneous						
	Aluminum sign at main entrance	**1**	ls	10,000.00	10,000		
	Staging to exterior wall	**22,946**	sf	3.00	68,838		
	SUBTOTAL					1,013,860	
B2020	**WINDOWS**	*9,178*	sf				
	Curtainwall; 25% of glazed area	**2,294**	sf	110.00	252,340		
	Premium for sunscreen and light shelf elements	**1**	ls	50,000.00	50,000		
	Windows/storefront; 75% of glazed area	**6,884**	sf	85.00	585,140		
	Louvers (allowance)	**250**	sf	60.00	15,000		
	Backer rod & double sealant	**3,029**	lf	9.00	27,261		
	Wood blocking at openings	**3,029**	lf	4.00	12,116		
	SUBTOTAL					941,857	
B2030	**EXTERIOR DOORS**						
	Glazed entrance doors including frame and hardware; double door	**2**	pr	8,000.00	16,000		
	HM doors, frames and hardware- Double	**3**	pr	3,600.00	10,800		
	HM doors, frames and hardware- Single	**1**	ea	1,800.00	1,800		
	Backer rod & double sealant	**117**	lf	9.00	1,053		
	Wood blocking at openings	**117**	lf	4.00	468		
	SUBTOTAL					30,121	
	TOTAL - EXTERIOR CLOSURE						**$1,985,838**
B30	***ROOFING***						
B3010	**ROOF COVERINGS**						
	Flat roofing						
	PVC roof membrane fully adhered	18,240	sf	7.50	136,800		
	Insulation	18,240	sf	6.00	109,440		
	1/2" dens-deck protection board	18,240	sf	2.00	36,480		
	Reinforced vapor barrier	18,240	sf	1.00	18,240		
	Rough blocking	2,976	lf	6.00	17,856		
	Miscellaneous Roofing						
	Metal panels to underside of bridge connector	**672**	sf	86.00	57,792		
	Roof screens - allow	**1,100**	sf	50.00	55,000		
	Roof fascia/cornice	**744**	lf	90.00	66,960		
	Roof ladders	**1**	ls	3,000.00	3,000		
	Walk pads	**1**	ls	10,000.00	10,000		
	SUBTOTAL					511,568	
B3020	**ROOF OPENINGS**						
	Skylights, allow				NIC		
	Roof hatch	**1**	loc	2,500.00	2,500		
	SUBTOTAL					2,500	
	TOTAL - ROOFING						**$514,068**
C10	***INTERIOR CONSTRUCTION***						
C1010	**PARTITIONS**						

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
ADDITION							
	Reinforced masonry shear walls at elevator	**1,764**	sf	25.00	44,100		
	Stairs; 2 HR rated	**3,948**	sf	16.00	63,168		
	Corridors; GWB with 2 lyrs corridor side	**13,216**	sf	15.55	205,509		
	Demising; Metal stud w/ 2 layers gwb	**8,988**	sf	17.35	155,942		
	Partitions at Admin spaces, back of house etc.	**1,554**	sf	15.85	24,631		
	Plumbing walls	**1,316**	sf	16.00	21,056		
	Sealants & caulking at partitions	**29,470**	sf	0.50	14,735		
	Rough blocking to partitions	**2,267**	lf	3.00	6,801		
	Operable partitions	**1,056**	sf	75.00	79,200		
	Glazed partitions/borrowed lights - allowance	**1**	ls	50,000.00	50,000		
	Miscellaneous GWB	**39,580**	gsf	5.00	197,900		
	SUBTOTAL					863,042	
C1020	**INTERIOR DOORS**						
	Allowance for specialty doors, doors and hardware	**39,580**	gsf	5.00	197,900		
	SUBTOTAL					197,900	
C1030	**SPECIALTIES / MILLWORK**						
	Toilet Partitions and accessories	**39,580**	gsf	1.25	49,475		
	Backer panels in electrical closets	**1**	ls	1,000.00	1,000		
	Marker boards/tackboards in classrooms, offices, conference rooms, library and MP rooms; 20' tackboard w/ 8' markerboard in each Educational space	**39,580**	sf	1.00	39,580		
	Building directory	**1**	loc	3,000.00	3,000		
	Bronze dedication plaque	**1**	loc	2,500.00	2,500		
	Room Signs	**39,580**	gsf	0.40	15,832		
	Fire extinguisher cabinets	**13**	ea	350.00	4,550		
	Lockers	**39,580**	gsf	1.00	39,580		
	Janitors Closet Accessories	**1**	ls	1,000.00	1,000		
	Shelving in storage rooms	**1**	ls	10,000.00	10,000		
	Expansion joints	**1**	ls	7,000.00	7,000		
	Miscellaneous metals throughout building	**39,580**	sf	1.25	49,475		
	Miscellaneous sealants throughout building	**39,580**	sf	1.00	39,580		
	SUBTOTAL					262,572	
	TOTAL - INTERIOR CONSTRUCTION						**$1,323,514**
C20	***STAIRCASES***						
C2010	**STAIR CONSTRUCTION**						
	Metal pan stair; egress stair	**4**	flt	30,000.00	120,000		
	Concrete fill to stairs	**4**	flt	2,000.00	8,000		
	SUBTOTAL					128,000	
C2020	**STAIR FINISHES**						
	High performance coating to stairs including all railings etc.	**4**	flt	3,000.00	12,000		
	Rubber tile at stairs - landings	**600**	sf	12.00	7,200		
	Rubber tile at stairs - treads & risers	**460**	lft	22.00	10,120		
	SUBTOTAL					29,320	
	TOTAL - STAIRCASES						**$157,320**
C30	***INTERIOR FINISHES***						
C3010	**WALL FINISHES**						

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CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
ADDITION							
	Allowance for wall finishes	**39,580**	gsf	6.00	237,480		
	SUBTOTAL					237,480	
C3020	**FLOOR FINISHES**						
	Allowance for floor finishes	**39,580**	gsf	8.00	316,640		
	SUBTOTAL					316,640	
C3030	**CEILING FINISHES**						
	Allowance for ceiling finishes/insulation underneath parking area	**15,140**	sf	8.00	121,120		
	Allowance for ceiling finishes	**39,580**	sf	7.00	277,060		
	SUBTOTAL					398,180	
	TOTAL - INTERIOR FINISHES						**$952,300**
D10	***CONVEYING SYSTEMS***						
D1010	**ELEVATOR**						
	New elevator; 3 stop	**1**	ea	120,000.00	120,000		
	SUBTOTAL					120,000	
	TOTAL - CONVEYING SYSTEMS						**$120,000**
D20	***PLUMBING***						
D20	**PLUMBING, GENERALLY**						
	Plumbing; complete system	**39,580**	gsf	14.00	554,120		
	SUBTOTAL					554,120	
	TOTAL - PLUMBING						**$554,120**
D30	***HVAC***						
D30	**HVAC, GENERALLY**						
	HVAC complete system	**39,580**	gsf	36.00	1,424,880		
	SUBTOTAL					1,424,880	
	TOTAL - HVAC						**$1,424,880**
D40	***FIRE PROTECTION***						
D40	**FIRE PROTECTION, GENERALLY**						
	Sprinkler system at parking area; dry system	**15,140**	gsf	5.00	75,700		
	Sprinkler system	**39,580**	gsf	4.50	178,110		
	SUBTOTAL					253,810	
	TOTAL - FIRE PROTECTION						**$253,810**
D50	***ELECTRICAL***						
D5010	**COMPLETE ELECTRICAL SYSTEM**						
	Lighting and FA at parking area	**15,140**	gsf	12.00	181,680		
	Electrical system; complete	**39,580**	gsf	30.00	1,187,400		
	SUBTOTAL					1,369,080	
	TOTAL - ELECTRICAL						**$1,369,080**
E10	***EQUIPMENT***						

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Ottoson Middle School
RENOVATIONS + ADDITION
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Feasibility Design Estimate

GFA 39,580

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
ADDITION							
	E10 EQUIPMENT, GENERALLY						
	AV Equipment (including Smartboards, Projectors, LED monitors, Digital information displays etc.)				FF+E		
	SUBTOTAL					-	
	TOTAL - EQUIPMENT						
	E20 FURNISHINGS						
	E2010 FIXED FURNISHINGS						
	Entry mats & frames - recessed with carpet/rubber strips	**500**	sf	45.00	22,500		
	Manual operated roller shades	**6,884**	sf	6.00	41,304		
	Counters, base cabinets, tall storage in classrooms and other rooms	**39,580**	gsf	7.00	277,060		
	SUBTOTAL					340,864	
	E2020 MOVABLE FURNISHINGS						
	All movable furnishings to be provided and installed by owner						
	SUBTOTAL					NIC	
	TOTAL - FURNISHINGS						**$340,864**
	F10 SPECIAL CONSTRUCTION						
	F10 SPECIAL CONSTRUCTION						
	No Work in this section						
	SUBTOTAL						
	TOTAL - SPECIAL CONSTRUCTION						
	F20 SELECTIVE BUILDING DEMOLITION						
	F2010 BUILDING ELEMENTS DEMOLITION						
	Create openings to existing façade for new connections	**2**	loc	10,000.00	20,000		
	SUBTOTAL					20,000	
	F2020 HAZARDOUS COMPONENTS ABATEMENT						
	None Included						
	SUBTOTAL						
	TOTAL - SELECTIVE BUILDING DEMOLITION						**$20,000**

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Edward Devotion School
Addition & Renovations
Brookline, MA

30-Mar-15

Schematic Design Estimate

CSI CODE	DESCRIPTION	QTY	UNIT	UNIT COST	EST'D COST	SUB TOTAL	TOTAL COST
SITEWORK							
G	***SITEWORK***						
G10	**SITE PREPARATION & DEMOLITION**						
	Site construction fence/barricades	**700**	lf	14.00	9,800		
	Remove existing paving	**9,000**	sf	1.50	13,500		
	Remove existing retaining walls	**1**	ls	10,000.00	10,000		
	Miscellaneous demolition	**1**	ls	25,000	25,000		
	Site Earthwork						
	Allowance to alter grading at main entrance	**1**	ls	50,000.00	50,000		
	Reduce existing grade by 4ft	**3,111**	cy	40.00	124,440		
	Silt fence/erosion control, wash bays, stock piles	**700**	lf	15.00	10,500		
	Construction entrance	**1**	ls	10,000.00	10,000		
	SUBTOTAL					253,240	
G20	**SITE IMPROVEMENTS**						
	Asphalt Paving	*18,440*					
	gravel base; 12" thick	**683**	cy	35.00	23,905		
	asphalt; 4" thick	**2,049**	sy	26.00	53,274		
	VGC	**770**	lf	32.00	24,640		
	Add for accessible parking spots	**1**	ls	10,000.00	10,000		
	Enlarge exterior concrete landings	**4**	loc	5,000.00	20,000		
	New concrete paving	**900**	sf	10.00	9,000		
	New retaining walls	**320**	lf	280.00	89,600		
	Landscaping						
	Miscellaneous landscape repairs/upgrades	**1**	ls	30,000.00	30,000		
	SUBTOTAL					260,419	
G30	**CIVIL MECHANICAL UTILITIES**						
	Water supply						
	New DI piping; 6"	**150**	lf	100.00	15,000		
	FD connection	**1**	loc	2,000.00	2,000		
	Gate valves	**2**	loc	750.00	1,500		
	Connect to existing line (Wet Taps)	**1**	loc	10,000.00	10,000		
	Storm water						
	Allowance miscellaneous stormwater improvements	**1**	ls	40,000.00	40,000		
	SUBTOTAL					$68,500	
G40	**ELECTRICAL UTILITIES**						
	Power						
	Manhole, new	**1**	ea	9,000.00	9,000		
	Primary ductbank						
	Ductbank AA 2-4" PVC conduits	**150**	lf	60.00	9,000		
	Primary cabling	**150**	lf		Utility company		
	Pad mounted transformer	**1**	ea		Utility company		
	Transformer pad	**1**	ea	2,500.00	2,500		
	Communications						
	Manhole, new	**1**	ea	9,000.00	9,000		
	Communications ductbank CC						
	4-4" PVC conduits	**150**	lf	100.00	15,000		
	Cabling	**150**	lf		Utility company		
	Site Lighting						
	Lighting allowance	**1**	ls	20,000.00	20,000		
	SUBTOTAL					64,500	
	TOTAL - SITE DEVELOPMENT						***$646,659***